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ABSTRACT

The final report of a project on teaching and management techniques with severely disturbed and/or retarded children presents analysis of single subject research using contingent imitation of the child as an intervention technique. The effects of this technique were examined on the following behaviors: toyplay and reciprocal imitation, self stimulation, academic skills, rocking behavior, and stereotypic behavior. Results are said to have been negative or ambiguous, suggesting that the therapeutic uses of imitation as a consequence are of limited utility. The use of vicarious prompts (i.e., reinforcing a well-behaved child contingent on another child's misbehavior in the hope that the reinforcement would prompt the observing misbehaving child to improve) is said to have been effective, but only when the behavior of the group was already fairly well controlled. Also included is a guide for teachers in managing and teaching the severely disturbed and retarded, with sections on positive and negative reinforcement, stimulus control, extinction, punishment, use of the unexpected (including imitation of the child and humor), and self control. (CL)

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ED177757

Final Report

U.S. DEPARTMENT OF HEALTH,
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RESEARCH TO DEVELOP EFFECTIVE TEACHING AND MANAGEMENT TECHNIQUES FOR SEVERELY DISTURBED AND RETARDED CHILDREN

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December, 1978

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James M. Kauffman
and
Jay S. Birnbrauer
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Abstract

The purpose of the project was to evaluate simple, effective teaching and management techniques for use with severely disturbed and/or retarded children, particularly to evaluate the use of contingent imitation of the child as a teaching and management strategy. Several single-subject studies were conducted in which contingent imitation was used as an intervention technique. In addition, two studies investigating the use of vicarious prompts were conducted. The studies of contingent imitation yielded negative or at best ambiguous results, leading to the conclusion that it appears to be a technique of limited value. The studies of vicarious prompts indicated that calling attention of a misbehaving child to good behavior by reinforcing a well-behaved child is a useful technique when classroom behavior is already relatively well controlled.

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Introduction

The instructional and management problems presented by severely and profoundly handicapped children are so great that effective, efficient methods are essential. Teachers of severely and profoundly handicapped children are constantly searching for more effective, "natural", and economical methods. This report is a description of research having to do with effective teaching and management techniques that can be used with children who are severely disturbed and/or retarded.

Behavioral researchers have, during the past two decades, devised and tested teaching and management procedures which are, indeed, effective. Many of these procedures (e.g., token reinforcement, programmed instruction, time out), though effective if properly implemented, demand the expenditure of a considerable amount of time or money or the construction of special materials or equipment. It would be of great benefit to teachers and children to find methods that are less costly of time, effort, and money. A logical and fruitful approach to the problem of finding such methods is to investigate the use of naturally occurring human interactions. Behavioral research has, in fact, included experimental analyses of such "natural" consequences as praise, ignoring, and criticism. The results of such research have had a profound influence on the development of simple but effective teaching strategies (Birnbrauer, 1976; Kauffman, 1977; Lovaas, Young, & Newsom, 1978). We began our research with the assumption that there are likely additional "natural" consequences or interactions that can be used as effective, efficient teaching tools but that have not been systematically or extensively researched.

The primary but not exclusive aim of our research was to evaluate the use of imitating the child as a behavior change strategy. Imitating the child has been described anecdotally as an effective teaching technique (e.g., Des Lauriers & Carlson, 1969; Steucher, 1972), but its worth as a therapeutic tool has not heretofore been experimentally evaluated, except in a few case studies (Kauffman, Hallahan, Brame, Haas, & Boren, 1978; Kauffman, Hallahan, & Ianna, 1977; Kauffman, LaFleur, Hallahan, & Chanes, 1975). We were interested in answering the following questions: (1) How and under what circumstances can imitating the child be used as a reinforcing event? (2) How and under what circumstances can imitating the child be used as a punishing event? (3) How and under what circumstances can imitating the child be used to accelerate the child's acquisition of an imitative repertoire? and (4) What advantages or disadvantages does imitating the child have compared to other teaching and management strategies?

A second purpose of our project was to investigate the use of other simple techniques which seemed appropriate for our subjects and settings. We completed two experiments in which we investigated the use of vicarious prompts (i.e., reinforcing a well-behaved child contingent on another child's misbehavior in the hope that the reinforcement would prompt the observing miscreant to improve his behavior). Previous studies (Kazdin, 1973, 1977; Kazdin, Silverman, & Sittler, 1975) have investigated vicarious reinforcement, in which reinforcement was delivered contingent on the model's good behavior but not contingent on the observer's misbehavior, but none has evaluated vicarious prompts. We were interested in answering the following questions: (1) With what types of children are vicarious prompts successful? (2) Are vicarious prompts using social reinforcement and token reinforcemet comparable? and (3) How does vicarious prompting compare to response cost involving token loss?

A third goal was to review the extant literature and prepare a monograph for teachers. The monograph was intended to be a review and synthesis of research findings that classroom teachers could use to guide their selection of intervention strategies with severely disturbed and retarded pupils.

Method

With one exception (Appendix H), our research method involved single-case experimental design (Herson & Barlow, 1976). The methodological details of each of our studies are reported in Appendixes A-I.

We began by studying contingent imitation as an aversive or rewarding consequence and as a means of inducing reciprocal imitation (Appendixes A-D and F-H). Because the results of these studies were consistently disappointing, we did not proceed to studies of the value of imitating the child during imitation training. The lack of encouraging results from our studies of imitating children led us to conduct two investigations of vicarious prompts (Appendix I).

Results

The details of the results of each study are reported in Appendixes A-I. In their aggregate, our results are reported under Conclusions and in our monograph for teachers (Appendix M).

Conclusions

Although our studies of the effects on children of being imitated were mostly disappointing, yielding negative or ambiguous results, a conclusion that the topic of our investigations is unimportant is certainly not justified. Recent research and comment by McCall, Parke, and Kavanaugh (1977) and Yando, Seitz, and Zigler (1978) has indicated that being imitated may be an important variable in social and cognitive development. Additional research is needed to determine how being imitated affects normal children's social and cognitive growth.

Regarding the therapeutic uses of imitation as a consequence, the results of our research lead us to the conclusion that it is a technique of limited utility. Our results lead us to that conclusion in spite of favorable outcomes of previous experimental case studies and anecdotal reports of successful outcomes. We should note, however, that our conclusion regarding the use of contingent imitation should be tempered by the realization that our subjects, settings, and procedures did not exhaust the possibilities of research in this area. That is, it is entirely plausable that imitating children is quite effective in some cases but that our wisdom in selecting subjects, target behaviors, and experimental conditions was lacking (in other words, our conclusion may be in effect a Type II error). Given the pervasiveness of being imitated in social interactions and the currently available experimental data showing the effects of being imitated, it is reasonable to believe that imitating children is a social consequence of potential therapeutic power. However, being imitated is a topic of only recent research interest, and our negative results may only indicate our lack of sophistication in thinking about the phenomenon.

Regarding our research on the use of vicarious prompts, our conclusions are on somewhat firmer ground. Vicarious prompting--reinforcing desirable behavior of one child when another is misbehaving in a way that is obvious to the misbehaving child--appears to be effective, but only when the behavior of the group is already fairly well controlled. Thus vicarious prompts should not be relied upon to produce therapeutic change in a very disruptive or chaotic group, but they are a "tried and true" method for the teacher who has first clearly established control through other means.

Our review of recent research for our monograph confirms the basic suggestions made to classroom teachers by behavioral researchers over the past decade. That is, consistency, careful sequencing of learning tasks, and reward for appropriate performance are the most important keys to success.

Dissemination Activities

Two articles (Appendixes H and I) were submitted to professional journals for possible publication. Three papers (Appendixes J, K, and L) were presented at professional meetings. A monograph for teachers (Appendix M) summarizing relevant research was prepared. Five hundred copies were printed and made available from the Department of Special Education, University of Virginia. Copies are being sent to members of the Southeastern Regional Coalition for Education of the Severely and Profoundly Handicapped for possible use in their teacher preparation programs and to selected teacher preparation programs in other parts of the country. In addition, the monograph is being sent to the ERIC Clearing-house system and Resources in Education.

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APPENDIX A

APPENDIX A

The Rise and Fall of an Intervention Procedure with a Single Subject

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Previous case reports of imitation as a consequence have failed to provide an explanation of why imitating the child may be an effective technique. Furthermore, contingent imitation of self-stimulatory behaviors has not been tried. The present study was an attempt to apply imitation to self-stimulation and to find an explanation for the effects (if there are any) of imitating the child. We suspected, first, that because imitating the child briefly interrupts on-going activity it may actually serve as a brief time out. If this is so, then any other brief interruption (e.g., a contingent novel nonimitative response of the teacher) should serve just as well as a matching (imitative) response. Thus, our first control condition was one in which a novel nonimitative response was made contingent on self-stimulation. Our second suspicion was that if interruption of on-going activity was, in effect, a brief time out, then the interruption should be differentially effective depending on the schedule of reinforcement in effect at the time. Interruption (time out) during a relatively rich schedule (e.g. FR 3) should have different effects than interruption during a relatively lean schedule (e.g., FR 12). Thus, we compared our procedures during FR 3 and FR 12. Finally, we thought that if imitating the child had no effect initially it could be made into a conditioned aversive consequence by pairing it with another aversive event such as time out. Consequently, we first tried imitation alone and later paired with time out.

Subject and Setting

The subject was a 13-year old moderately retarded girl who spoke very few words, was oppositional, and displayed a rich variety of self-stimulatory responses. The target self-stimulation response in the beginning of the study was tongue pulling, i.e., jerking the tongue with forefinger and thumb. All sessions were conducted in a small classroom at DeJarnette Center equipped with a one-way window and sound system for observation purposes. The subject and trainer were the only persons in the room during experimental sessions.

Procedure

Data were coded for 20 min. daily using a continuous 10 sec. interval recording system cued by a cassette tape equipped with an ear plug. Each session was divided into 10 min. of FR 3 reinforcement with tangibles (usually raisins) and praise on one side of the room followed by FR 12 for 10 min. on the other side of the room. During phases 2 and 4 the order of schedule was reversed, i.e., FR 12 first, FR 3 second. (Since analysis of the data indicated no consistent differences related to schedule order, no further mention will be made of this variable in interpreting our findings.) The trainer and child sat knee-to-knee. Simple commands (e.g., "Suzy, touch your nose") or requests for verbal or motor imitation were given. The commands were given verbally; demonstration and guidance were added as required to obtain a correct response. Thus, every trial culminated in a correct response and social praise (and tangible reinforcement on every third or twelfth trial as well). If the child did not imitate correctly following prompts, the trainer administered a 10 sec. time out, i.e., took up reinforcers, paper, and pen, and looked at her lap until signalled by the observer that 10 sec. had elapsed and the subject was sitting with her hands in her lap.

The first thirteen experimental phases comprised the study as summarized below:

Phase	Description	No. of Sessions	Contingency
1.	Baseline 1 (B1)	8	FR3, FR 12
2.	Reversal (R)	5	FR 12, FR3
3.	Reversal Control (RC)	6	Same as 2, plus trainer rubbed shoulder each time subject pulled tongue
4.	Reversal (R)	5	Same as 2
5.	Imitation of Tongue Pulling (I-T)	19	Trainer pulled own tongue imitatively
6.	Imitation Plus Time Out (I-TO)	12	Trainer pulled on tongue imitatively plus followed imitation with 10 sec. time out (only 6 sessions plotted)
7.	Imitation of Tongue Pulling (I-T)	7	Same as 5
8.	Imitation of Tongue Pulling--Generalization	6	Same as 7 but with substitute trainer
9.	Baseline (B2)	10	FR 12, FR 3

Phase	Description	No. of Sessions	Contingency
10.	Baseline (B3)	5	FR 12, FR 3, (also began recording nose touching)
11.	Imitation of Nose Touching (I-N)	6	Same as 10, plus trainer touched own nose imitatively (also began recording head touching)
12.	Imitation of Nose Touching and Head Touching (I-NH)	15	Same as 11, plus trainer touched own head imitatively
13.	Imitation of Nose Touching, Head Touching, and Tongue Pulling (I-NHT)	5	Same as 12, plus trainer pulled own tongue imitatively

Results and Discussion

Means and ranges for each of the three target behaviors (tongue pulling, nose touching, and head touching) for each of the first 13 experimental phases are shown in Figure 1. Trends across phases for each of the three behaviors are shown in Figure 2. Novel nonimitative behavior by the trainer contingent on tongue pulling was not an effective decelerating consequence; neither was contingent imitation alone effective (phase 5, I-T). However, imitation plus time out decreased tongue pulling from a mean of about 30 percent of observation intervals to a mean of about 7 percent. When time out was discontinued but contingent imitation was continued, tongue pulling remained at less than 10 percent. Furthermore, tongue pulling remained low in sessions with a different trainer who had not administered time out but who applied contingent imitation (phase 8, I-TG). Baseline rates of tongue pulling were not recovered when contingent imitation was discontinued (B2). When contingent imitation was applied to a second response (nose touching), this response dropped dramatically from about 50 percent during baseline to near zero. At this point it appeared that imitation had acquired aversive properties, but in a later phase (I-NHT) we were not successful in suppressing tongue pulling which meanwhile had gradually increased to a mean value of about 25 percent. We were also not successful in suppressing a third stereotypic response by contingent imitation--head touching.

If imitation had become a conditioned aversive event by virtue of its being paired with time-out, then it is not surprising that its effectiveness diminished over time in the absence of back-up aversive events. At the same time, it would not be appropriate, of course, to attribute the temporary success with imitation, i.e., the suppression of nose-touching, to the history of pairing we provided.

Five additional experimental phases were run with results as indicated in Table 1. The data indicate that tongue pulling did finally decline with imitation plus a 20 sec. time out but quickly resumed when time out was discontinued, i.e., contingent imitation alone was not effective the second time (compare phases 6 and 7 to phases 17 and 18).

We are left without evidence that contingent imitation alone or after pairing with time out is an effective decelerating event. However, it should be noted that touching nose and head were behaviors called for and/or modeled during training. Their choice as target responses, therefore, may have been ill advised. Kauffman, La Fleur, Hallahan, and Chanes (1975) also found that imitation did not serve as a decelerating consequence (and in fact was an accelerator) for vocal noises during language training sessions which called for imitative vocalizations by the child. If we had dropped touching nose and head as instructional items, perhaps our results would have been different. Contingent imitation of a response that is being taught may present the child with a very ambiguous discrimination problem, especially when contingent imitation is paired with time out.

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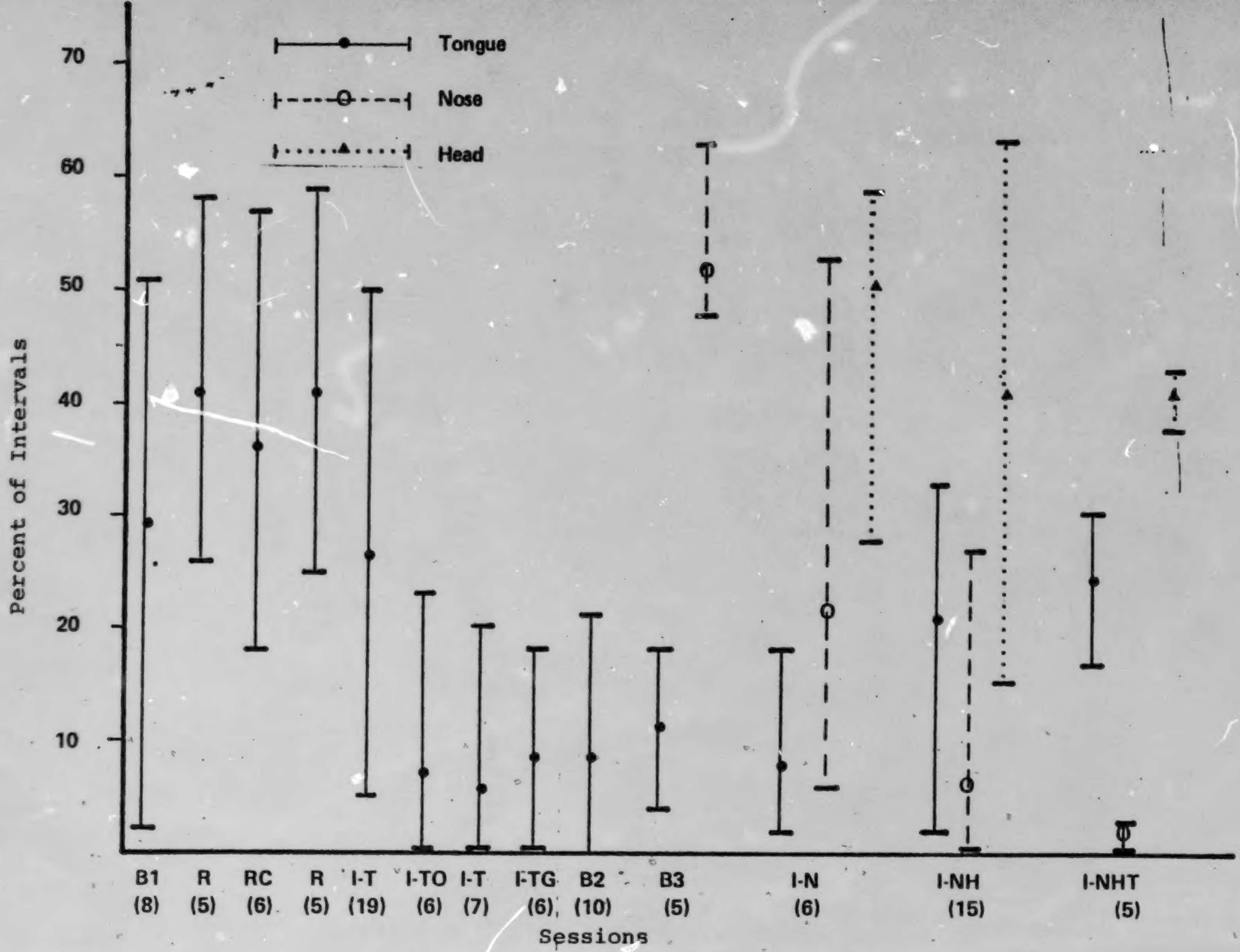
Tongue
Nose
Head
70
60
50
40
30
20
10
Percent of Intervals
B1 (8)
R (5)
RC (6)
R (5)
I-T (19)
I-TO (6)
I-T (7)
I-TG (6)
B2 (10)
B3 (5)
I-N (6)
I-NH (15)
I-NHT (5)
Sessions

FIGURE 1

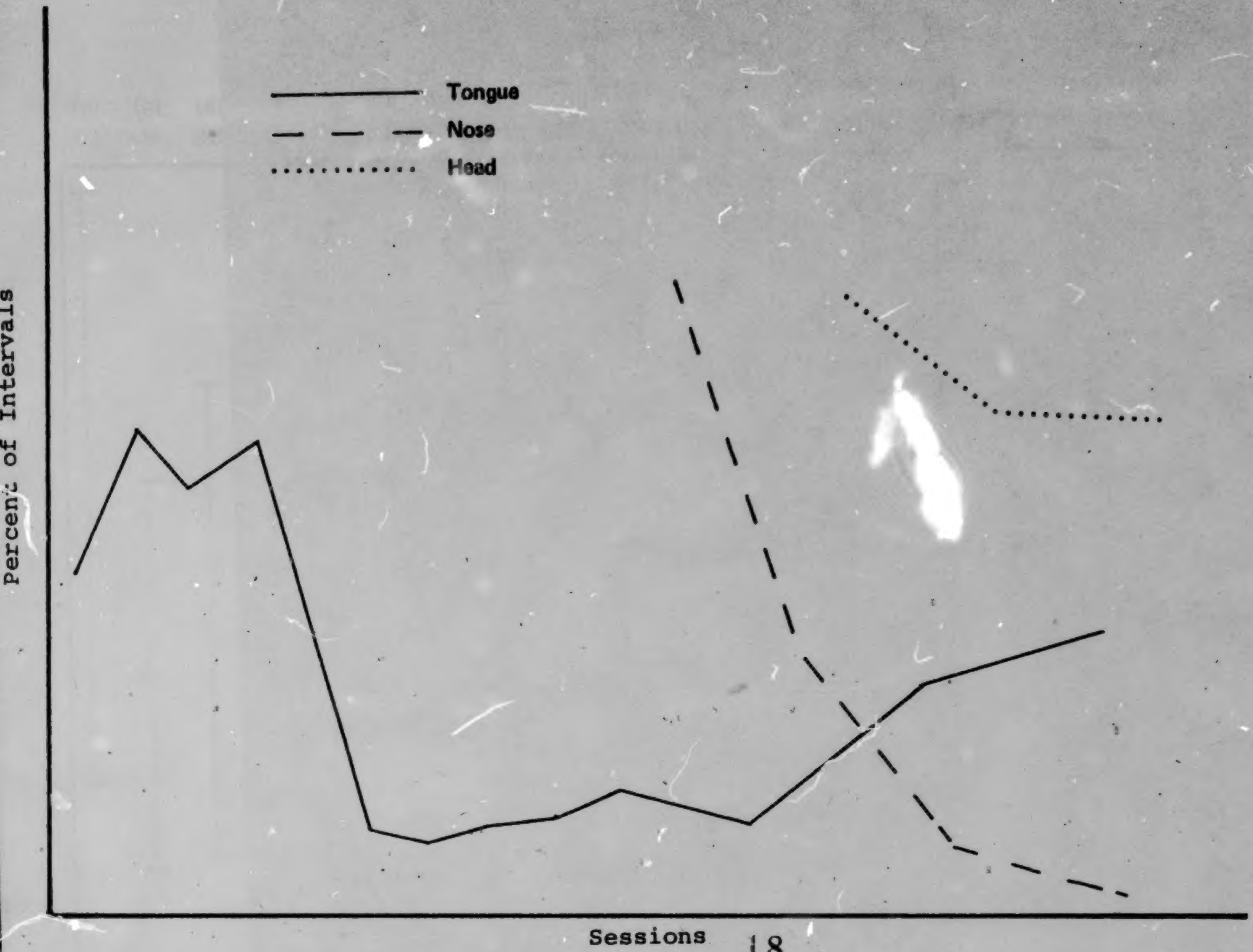

FIGURE 2

Table 1

Phase	Description	No. of Sessions	Contingency	Behavior	Mean	Range
14.	Imitation of Tongue Pulling (I-T)	4	Trainer pulled own tongue imitatively	Tongue Nose Head	22.3 1.0 51.0	7-27 0-2 43-58
15.	Imitation of Tongue Pulling Plus Time Out (I-TO 10)	10	Trainer pulled own tongue imitatively plus followed imitation with 10 sec. time out	Tongue Nose Head	21.2 0.5 44.9	8-28 0-1 0-59
16.	Imitation of Tongue Pulling Plus Time Out (I-TO 20)	12	Same as 15 but with 20 sec. time out	Tongue Nose Head	11.9 0 38.8	3-20 0 7-63
17.	Imitation of Tongue Pulling and Head Touching, 20 sec. Time Out for Tongue Pulling, no Time Out for Head Touching (I-TO 20 + IH)	3	Same as 16 but with imitation for head touching	Tongue Nose Head	16.7 0 50.3	15-19 0 39-61
18.	Imitation of Tongue Pulling and Head Touching (I-TH)	4	Same as 17 but without time out	Tongue Nose Head	31.3 0.3 63.8	25-37 0-1 56-75

APPENDIX B

APPENDIX B

Effects of Imitation on Toy Play and Reciprocal Imitation

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In previous studies it has been found that imitating the child can induce reciprocal imitation (Hallahan, Kauffman, Kneedler, Snell, & Richards, 1977; Kauffman, Snell, & Hallahan, 1976) and serve as an accelerating consequence (Kauffman, LaFleur, Hallahan, & Chanes, 1975). The purpose of the present study was to examine both the possible reinforcing effects of contingent imitation and its potential to induce reciprocal imitation in a single experimental session.

Subjects and Procedure

We began with six children who were residents at DeJarnette Center. Because the results were very inconsistent for four of the six subjects (e.g., one child imitated an adult almost always, regardless of any experimental condition, and other children's imitativeness seemed unrelated to any of the independent variables we were studying) we present data for only two children, Brian and Robert. Both boys were approximately 8 years of age at the time of the study.

Our general strategy was to have play sessions in which the child and adult had identical pairs of toys. The adult was either nonreactive, imitative, or nonimitative of the child's play in a given session. Interspersed among the periods of play were probes using a "cookie monster" apparatus (described in other research, e.g., Hallahan et al., 1977) to measure reciprocal imitation. The specific procedures and a drawing of the cookie monster apparatus are attached. With the two subjects for whom we report data we contrasted only imitation and nonreaction conditions, since the contrast of imitation and nonimitation conditions with other subjects produced ambiguous results.

Our expectation was that if being imitated during toy play was reinforcing, then the child should choose to play a greater percentage of time with the toy designated as imitative than the toys designated nonimitative or nonreactive. Thus, one dependent measure was the percent of intervals the child spent playing with

"Imitative" toys. We also reasoned that if being imitated induced reciprocal imitation, then the child should show more imitative responses on the probes following imitative play than on probes following nonimitative play or nonreaction. Our second dependent variable, therefore, was number of imitative responses or the cookie monster probe trials.

Results and Discussion

As shown in the attached figures, both Brain and Robert appeared to become more imitative and to play more often with "imitative" toys during imitation than nonreaction sessions. However, the effects of imitation were neither immediately apparent nor consistent. Furthermore, these minimally encouraging results were obtained for only two of six subjects originally chosen.

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OUTLINE OF PROCEDURES FOR IMITATION STUDY

Setting: Experimental room with Subject and Trainer sitting on floor facing each other, 3 feet apart. No furniture in room except table and cookie monster. Orientation of S and T is parallel to the observation window.

Materials: Pool of __pairs (one toy for S, and identical toy for T) of toys. Six pairs of toys are chosen each day, three of which are designated Imitative, Nonimitative, or Nonreactive.

Consequences:

Nonreactive Play--E gives 2 toys to S and 2 identical toys to T. T does not play with toys, just holds them and watches S. Every 15 seconds, T praises S for playing with toy; if S is not playing with toy, T comments, "It is nice to play with a ______(naming toy S played with last). If S tries to take T's toy, T says, "You have your own toys," and holds onto the toy. If S gets up, T remains seated and ignores S.

Nonimitative Play--Same as Nonreactive Play except when S plays with toy designated Nonimitative, T picks up other (nonidentical) toy and plays with it in a way that does not resemble what S is doing with the Nonimitative toy.

Imitative Play--Same as Nonreactive Play except when S plays with toy designated Imitative, T picks up same (identical) toy and matches as closely as possible what S does and says; and if S gets up, T gets up and mimics S.

Probes:

After 1 minute of play with a given set of toys, E comes into room with tray and says, "Now it's time to feed the cookie monster some cookies." E says, "OK, ____(T), you feed the cookie monster a cookie from this side of the tray." T chooses a cookie according to the protocol and feeds it according to the routine. E then says, "OK, _____(S), now it's your turn to feed the monster a cookie from this side of the tray," records S's responses, rearranges the cookies, and starts the next trial. After __(6 or 9)trials, E says, "OK, that's all for now. You two play some more with these toys until I come back." One minute later, E comes back and says, "Time to play with some different toys now," takes toys from T and S, gives them new toys, and says, "Here are new toys for you to play with."

Session Duration and Sequence:

Each session will consist of three 2-minute play periods. Each play period will be broken after 1 minute by a probe. Praise or comments will be given every 15 sec. during play. The sequence is as follows:

begin play period 1
15 sec.
30 sec. } praise or comment
45 sec.
60 sec.
probe
15 sec.
30 sec. } praise or comment
45 sec.
60 sec.
change toys
(repeat above sequence for play periods 2 and 3)

Observation and Recording

Observer will use a 5-sec. continuous interval tape to record *S*'s and *T*'s behavior.

S's Play--(enter name of toy)--toy in hand; picking up toy; any contact *except* accidental or toy resting in lap; may play with more than one toy per recording interval.

Mouthing--(enter M)--toy in contact with tongue or lips.

Dropping/Throwing--(enter D)

Destroying--(enter X)--breaking, taking apart toy, etc.

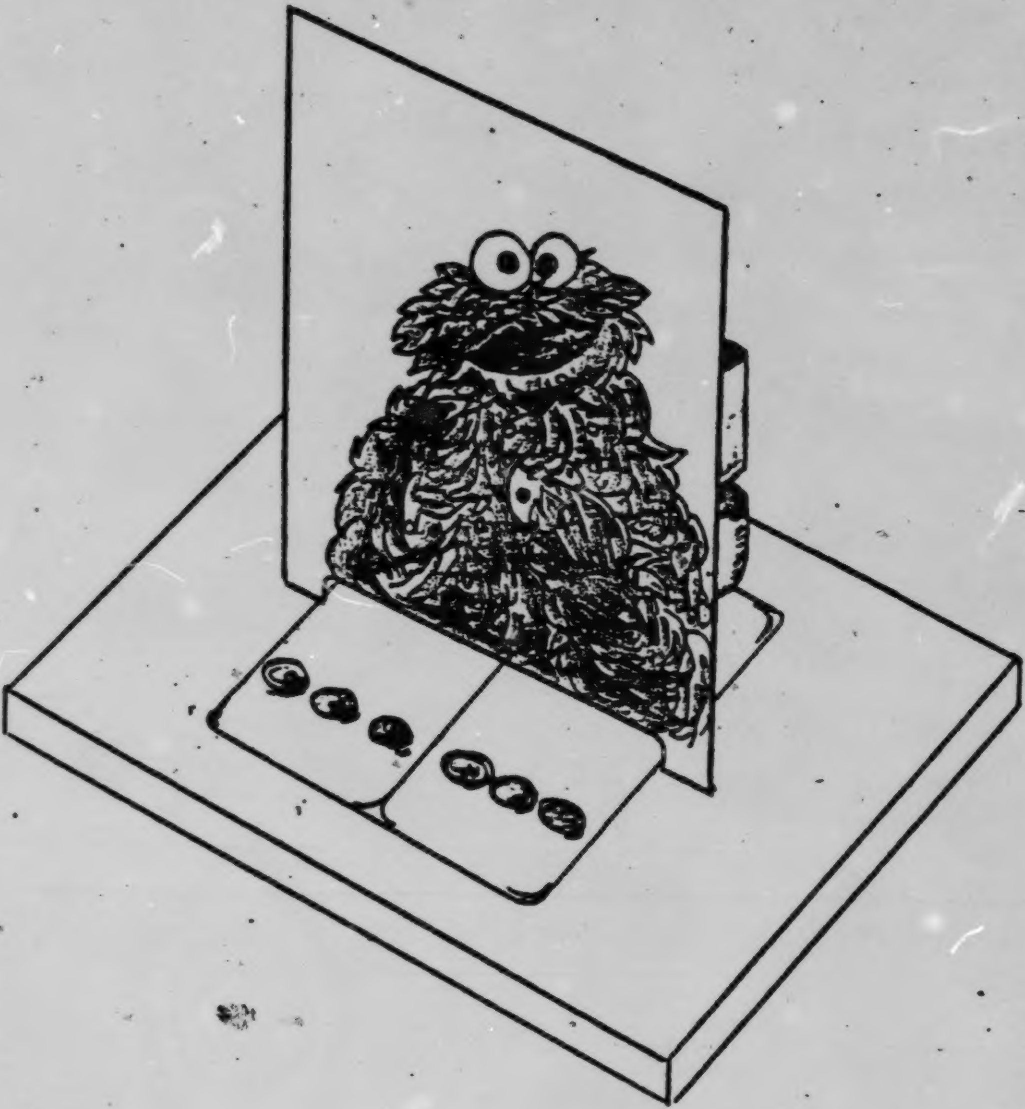
T's Behavior--check P (for praise); enter N (for nonimitative play) or I (for imitative play).

Probes--Record *S*'s imitative color choice, motor behavior, verbalization, and noncompliance.

Motor and Verbal Behaviors of Model on Probe Trials

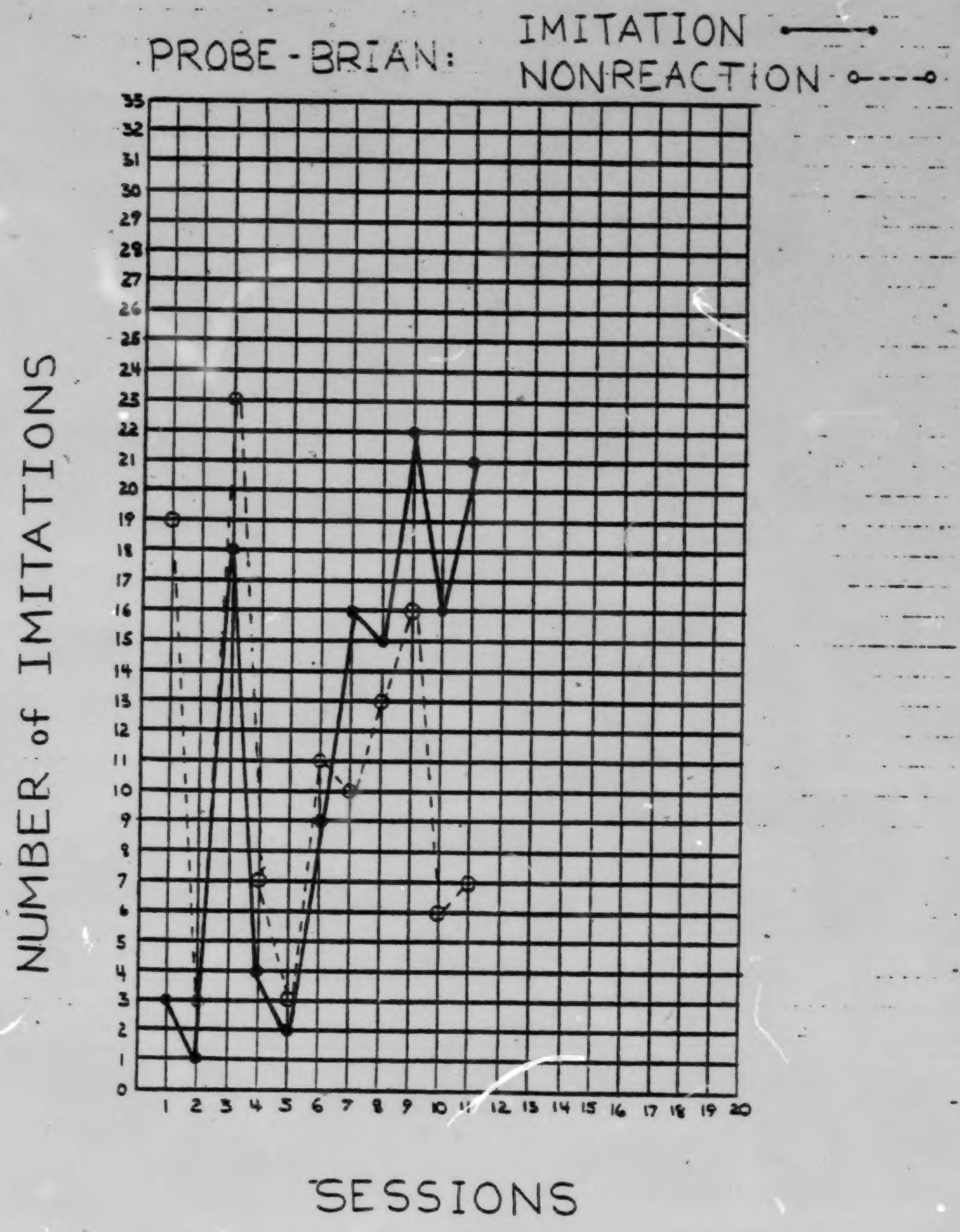
1. One eye closed, sighting, thumb & third finger, "Here comes your cookie."
2. Tap cookie on head, "This cookie's for your headache."
3. Clap, "This is a happy cookie."
4. Rub stomach, "Umm, I like this cookie."
5. Cover cookie with both hands, "Which cookie is this, monster?"
6. Tap cookie on table, "No crumbs on this cookie."
7. Lick lips, "This is a great cookie."
8. Pat monster's tummy, "Yummy, yummy, in the tummy."
9. Jerk hand away from monster's mouth, "Don't bite me."
10. Slide cookie off palm with fingers, "Slide this one in your mouth."
11. Use thumb & forefinger, "Take this tiny cookie."
12. Open mouth wide, "Open wide, now."
13. Hide cookie behind your back, "Where's the cookie?"
14. Sniff cookie, "This cookie smells just right."
15. Toss cookie from hand to hand, "Eeny, meeny, miney, mo."
16. Shake finger, "You better be good and eat this cookie."
17. Shame finger, "Shame on you, monster."
18. Pick up cookie with both hands, "This is a really heavy cookie."
19. Wave cookie in air, "This one's going to fly right in your mouth."
20. Cover monster's eyes, "Close your eyes and take your pill."
21. Tap cookie with finger, "Ha, ha, this cookie is so hard it'll break your teeth."
22. Cover your eyes, "This cookie is so yukky I can't look."
23. Salute, "Yes sir, monster, here is your cookie."
24. Hold cookie in front of monster's eyes, "Here's the very best one."
25. Flip cookie in tray, "It's heads, so you win."
26. Snap fingers, "I've got it, here's the one for you."
27. Hold stomach, "Oh, you must be so full of cookies."

FIGURE 1



Experimental apparatus for probes.

FIGURE 2


PROBE - BRIAN:
IMITATION
NONREACTION
NUMBER of IMITATIONS
SESSIONS
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
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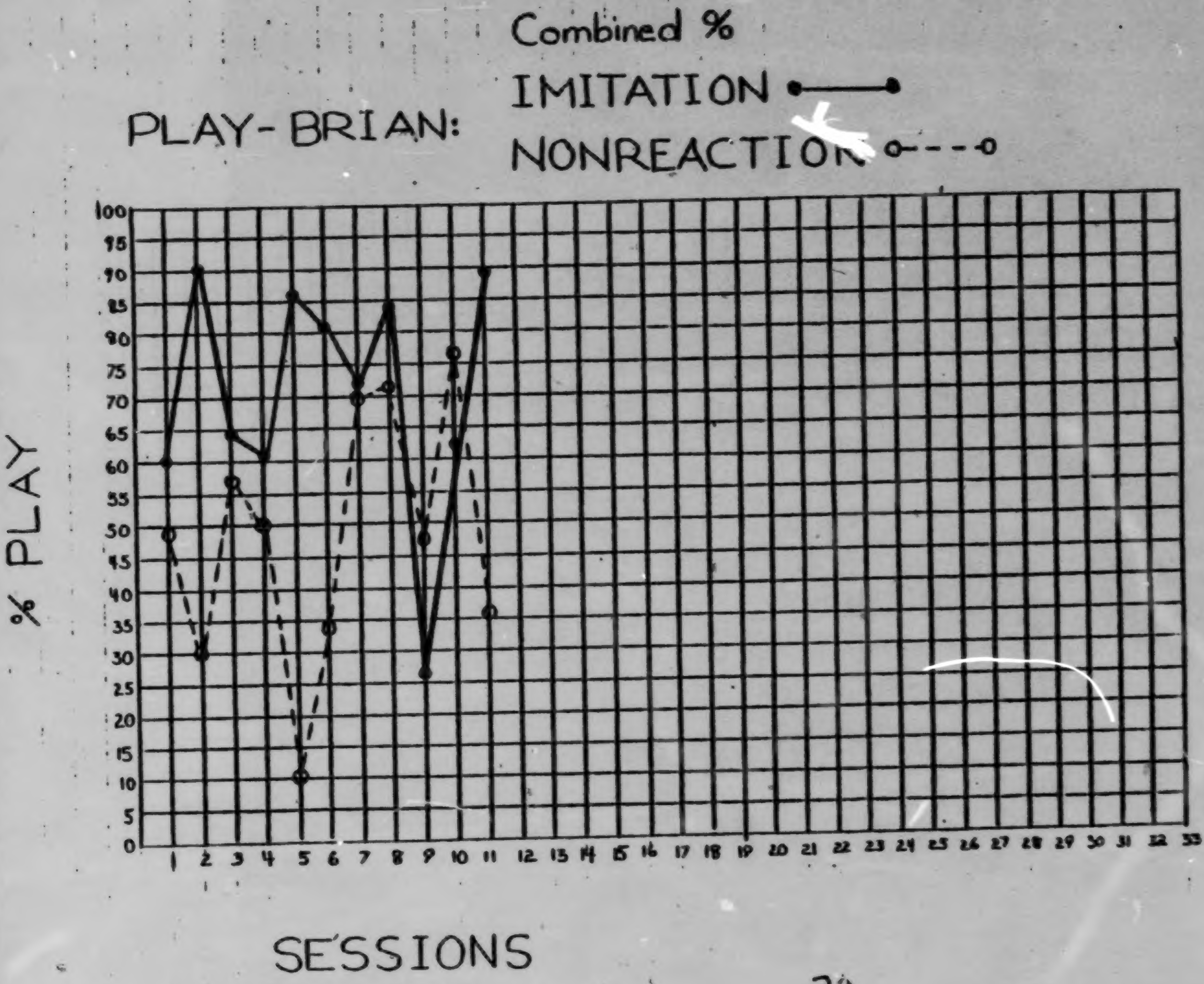
Combined %
PLAY- BRIAN:
IMITATION ●——●
NONREACTION ○- - -○
% PLAY
100
95
90
85
80
75
70
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55
50
45
40
35
30
25
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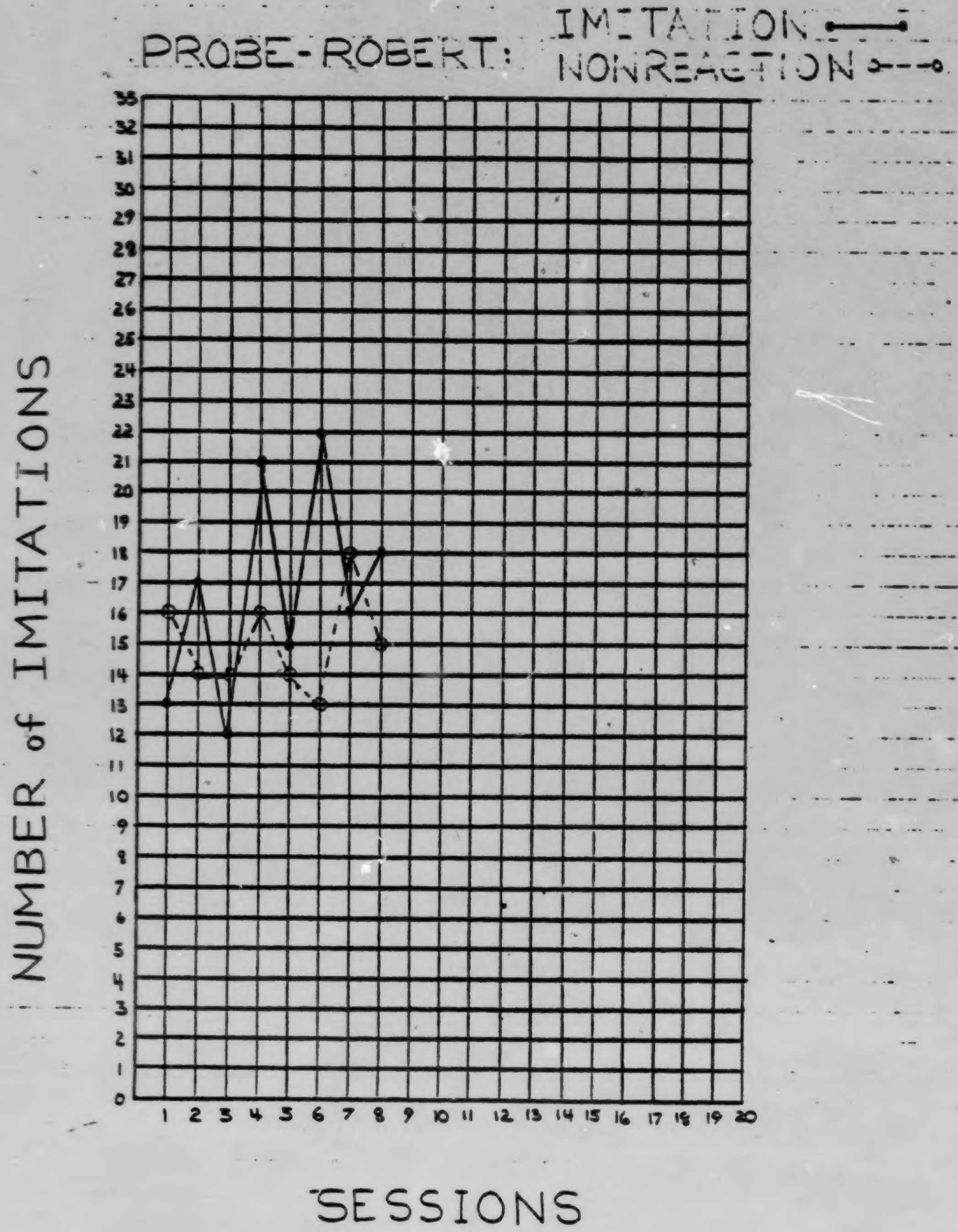
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
SESSIONS

FIGURE 4


PROBE-ROBERT:
IMITATION ●—●
NONREACTION ○- - -○
NUMBER of IMITATIONS
0
1
2
3
4
5
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8
9
10
11
12
13
14
15
16
17
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20
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33
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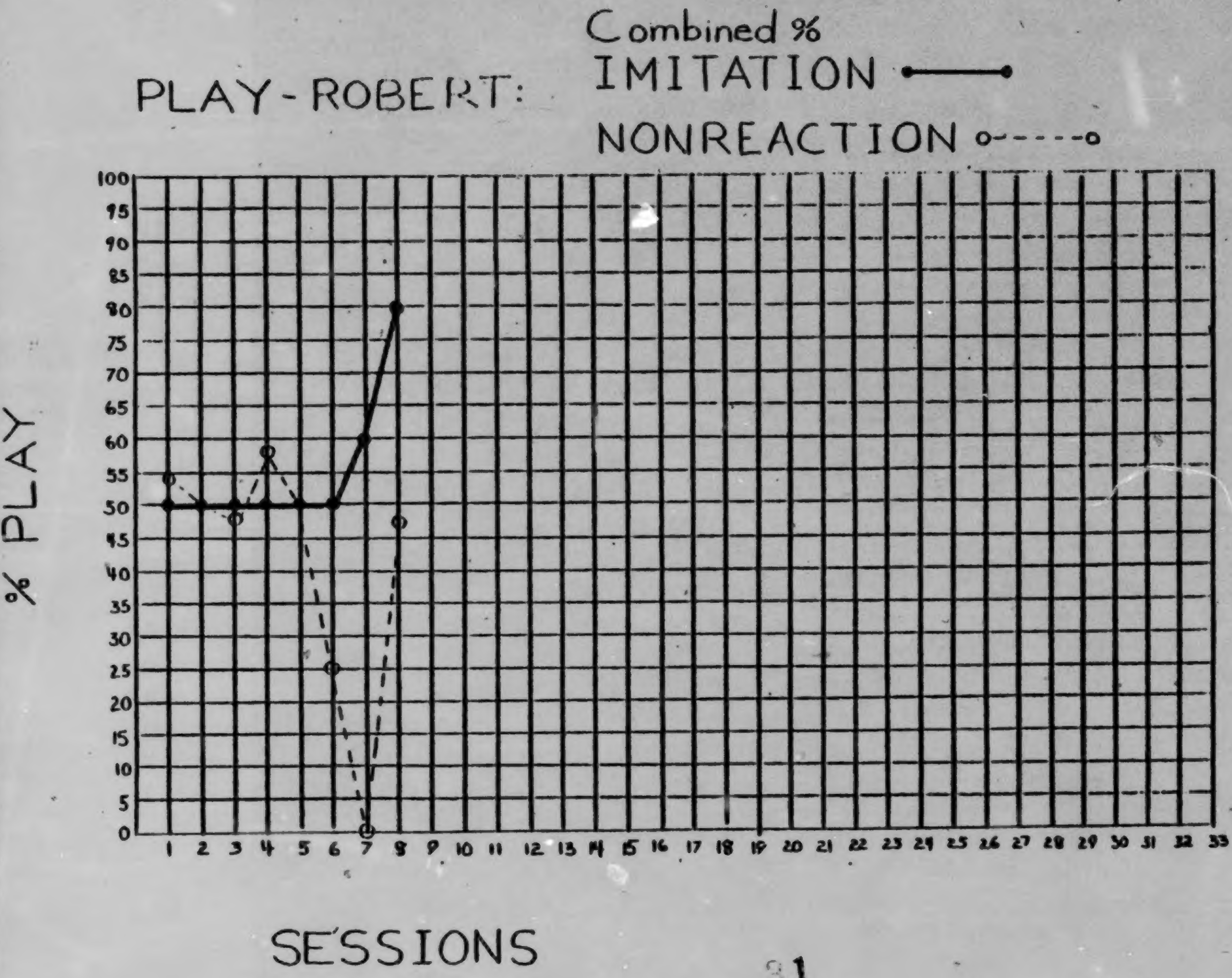
18
19
20
SESSIONS


PLAY-ROBERT:
Combined %
IMITATION
NONREACTION
% PLAY
100
95
90
85
80
75
70
65
60
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45
40
35
30
25
20
15
10
5
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
SESSIONS

FIGURE 5

APPENDIX C

APPENDIX C

Contingent Imitation of Thumbsucking

Jay S. Birnbrauer and Nancy Hopkins
DeJarnette Center for Human Development

Research has suggested that being imitated by an adult may be reinforcing or punishing to children. (Fouts, 1975 a,b; Fouts, Waldner, & Watson, 1976; Kauffman, Hallahan, & Ianna, 1977; Kauffman, LaFleur, Hallahan, & Chanes, 1975). Kauffman et al. (1975) reported two case studies in which the aim was to decrease high rate inappropriate behavior. In the first case, contingent imitation of sloppy eating was successful in reducing the inappropriate eating behavior of a retarded child. In the second case, contingent imitation of yelping increased the inappropriate vocal behavior of a retarded child. Thus, imitation served as an effective punisher for the first child and as a positive reinforcer for the second child.

The studies described here were conducted in order to assess the effects of an adult's imitating the thumbsucking behavior of two disturbed children.

Study I

Method

Subject

The subject was a 5-year old moderately disturbed female in residence at DeJarnette Center.

Procedure

The study was conducted during the first period of first-grade preparatory classroom. The subject sat with five other disturbed children in a semicircle facing the teacher. The lesson involved the teaching of verbal concepts and improving listening skills. An independent observer recorded on task behavior and thumbsucking behavior of all children in the group using a 10 sec. interval recording system. Baseline data were obtained for five days. Thumbsucking was ignored during the baseline phase, although the teacher would not call on a child while he was thumbsucking and she made statements like, "I'm going to call on Tommy because he has his hands down." An intervention phase was instituted next in which the teacher imitated the subject's thumbsucking, i.e., the teacher put her thumb in her mouth and looked at the subject until the subject withdrew her thumb. After four sessions involving contingent imitation, baseline conditions were reinstated and data recorded for 9 days.

Results

During baseline, the subject's rate of thumbsucking was variable, averaging about 16% of the intervals observed. The other children were not observed thumbsucking and their on-task behavior averaged 90%. In the intervention phase involving contingent imitation, there was no change in the subject's rate of thumbsucking. The other children's thumbsucking increased, and on-task behavior decreased 20%. The subject reacted to the teacher's imitation by saying, "Don't do that," etc. and by attempting to hide her thumbsucking. The other children seemed to enjoy watching the teacher imitate and tried to provoke the subject to suck her thumb. When baseline conditions were reinstated, control of the group was regained and thumbsucking was almost completely eliminated. It is difficult to interpret the outcome because there was a change in teachers and one of the children in the group was transferred to another class. Contingent imitation in this study did not function as an effective punisher, nor did it serve as a positive reinforcer for the subject. Its effect on the other children in the class suggests that it not be used when the peer group is likely to be reinforced by seeing the teacher imitate.

Study II

Method

Subject and Setting

The subject was a 7-year-old severely disturbed boy in residence at DeJarnette Center. Sessions were conducted in a small classroom in which only the subject and trainer were present.

Procedure

The study was conducted during individual sessions involving number recognition training. The trainer imitated the subject's thumbsucking in a manner identical to that described in Study I. The subject's rate of thumbsucking was recorded by an independent observer using an interval recording system. Baseline data were recorded for 9 sessions. The imitation procedure was terminated after two sessions because the subject exhibited a great deal of attention-seeking behavior during intervention.

Results

During baseline, the subject sucked his thumb an average of 41% of the time. Thumbsucking remained at 41% during the imitation phase. Although the subject's rate of thumbsucking did not decrease, he made a variety of attempts to prevent the trainer from imitating him. Essentially, he made a game out of the procedure by rapidly moving his thumb in and out of his mouth and laughing, holding the trainer's hand down while putting his thumb in his mouth, and hiding his head under the table when sucking his thumb. In addition, he frequently asked questions like "Why are you mocking me?" When imitation was discontinued, the subject questioned the trainer as to why she was no longer sucking her thumb.

As in the first study, imitation neither decreased nor increased thumbsucking behavior, and it elicited inappropriate attention seeking behavior.

References

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Fouts, G.T. Effects of being imitated on behavior of preschool girls and boys. *Perceptual and Motor Skills*, 1975, *41*, 75-78. (b)

Fouts, G.T., Waldner, D.N., & Watson, M.W. Effects of being imitated and counter-imitated on the behavior of preschool children. *Child Development*, 1976, *47*, 172-177.

Kauffman, J.M., Hallahan, D.P., & Ianna, S. Suppression of a retardate's tongue protrusions by contingent imitation: A case study. *Behaviour Research and Therapy*, 1977, *15*, 196-197 .

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C-4

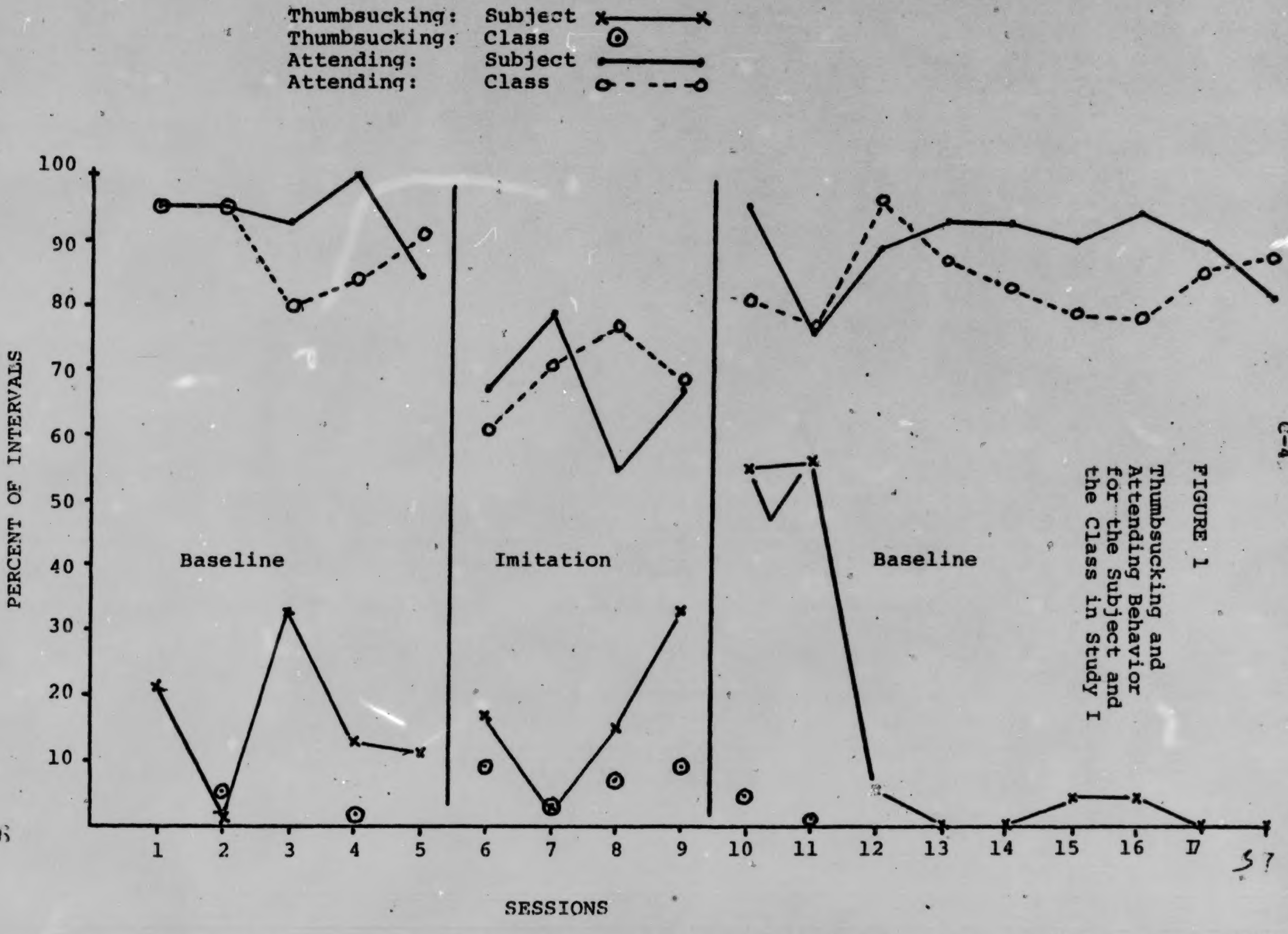
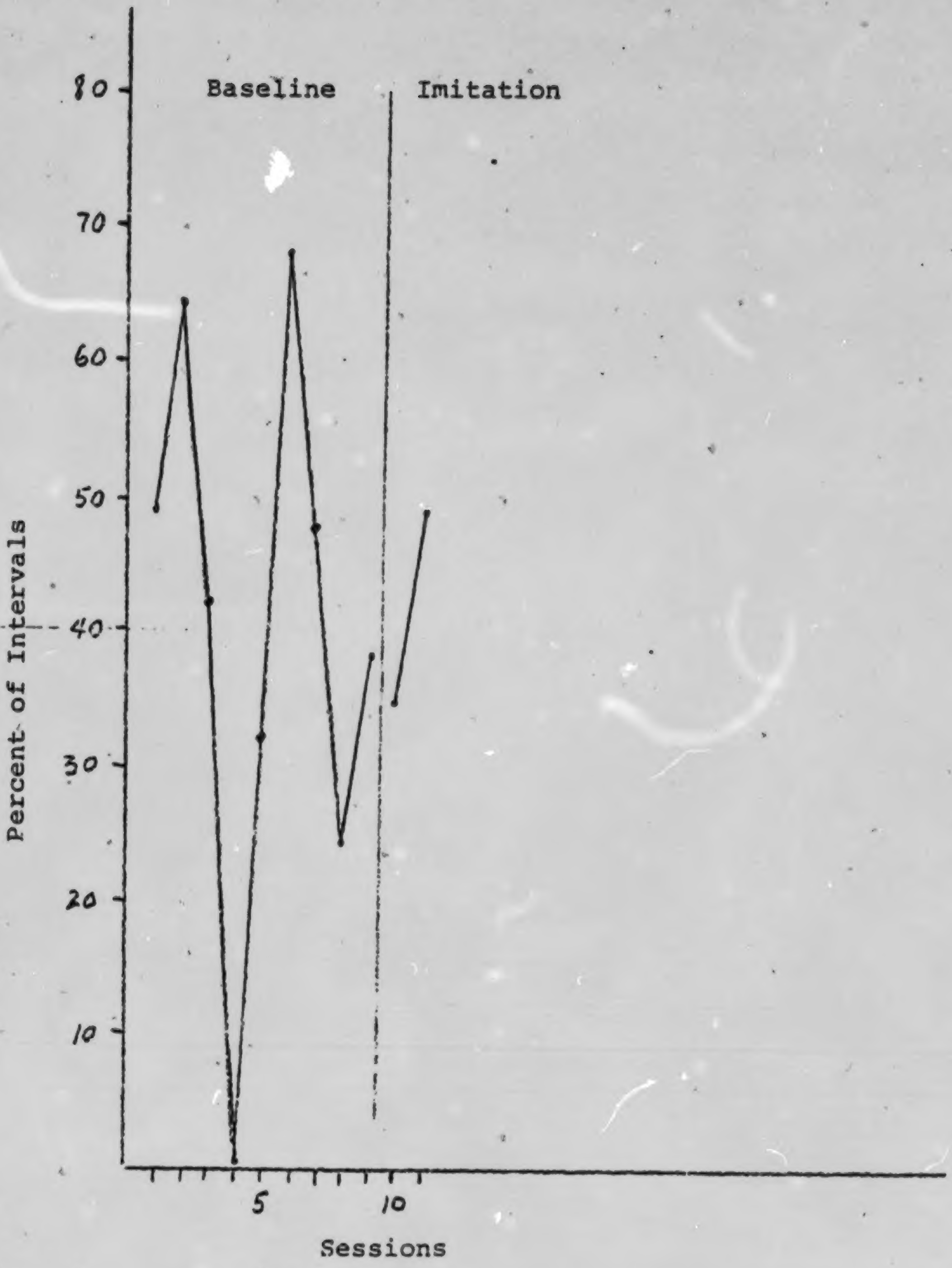


FIGURE 1
Thumbsucking and Attending Behavior for the Subject and the Class in Study I

FIGURE 2

THUMBSUCKING (Study II)



APPENDIX D

APPENDIX D

Contingent Imitation and Reprimands as Decelerating Consequences for Self-Stimulation

James M. Kauffman and Judy Boland
University of Virginia

Numerous anecdotal reports have held that imitating a child can have desirable effects on his behavior (see Kauffman, 1977). In addition to these reports, several research studies have demonstrated that contingent imitation can either accelerate or decelerate behavior. Kauffman, LaFleur, Hallahan, and Chanes (1975) found imitation by an adult successful in reducing the sloppy eating habits of a trainable mentally retarded girl. In another case, imitation increased the inappropriate vocal behavior of a trainable retarded girl. Kauffman, Hallahan, and Ianna (1977) instructed a teacher to imitate tongue protrusions of a trainable mentally retarded boy. Imitation was more effective than verbal reminders in decreasing tongue protrusions.

The present study compared the use of teacher reprimands with a procedure involving the use of reprimands combined with imitation to decrease bizarre facial expressions.

Subject

The subject was a 13-year-old severely disturbed, trainable mentally retarded girl in a special public school classroom for trainable mentally retarded students. She had formerly been a resident of DeJarnette Center for Human Development.

Procedure

The setting was a small group (the subject and two other children) instructional activity conducted by the teacher in the back of the classroom.

Facial expressions and inappropriate vocalizations by the subject were recorded by an independent observer using a 10 sec. observe, 5 sec. record system cued by a cassette tape-ear plug device. Baseline was conducted for 5 sessions during which bizarre faces were ignored. The teacher was then instructed to verbally reprimand the subject each time she exhibited a bizarre face. After 5 sessions involving the use of reprimands, baseline conditions were reinstated for 5 sessions. Finally, contingent imitation and verbal reprimands were used together to consequate bizarre faces.

Results and Discussion

Reprimands reduced the average frequency of bizarre faces from 63% to 18%. Inappropriate vocalizations also decreased during the reprimand phase. When baseline conditions were reinstated, bizarre faces rose above original baseline rates to an average of 70%. Inappropriate vocalizations increased simultaneously. Adding imitation of faces to reprimands again decreased bizarre faces as well as inappropriate vocalizations but did not produce any better results than the reprimands alone.

In this study, imitating the child did not elicit undesirable behavior from the subject or the other children in the group; however there did not appear to be any advantage in using contingent imitation along with teacher reprimands since reprimands alone were just as effective as the combined procedure.

References

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Kauffman, J.M., LaFleur, N.K., Hallahan, D.P., & Chanes, C.M. Imitation as a consequence for children's behavior: Two experimental case studies. Behavior Therapy, 1975, 6, 535-542.

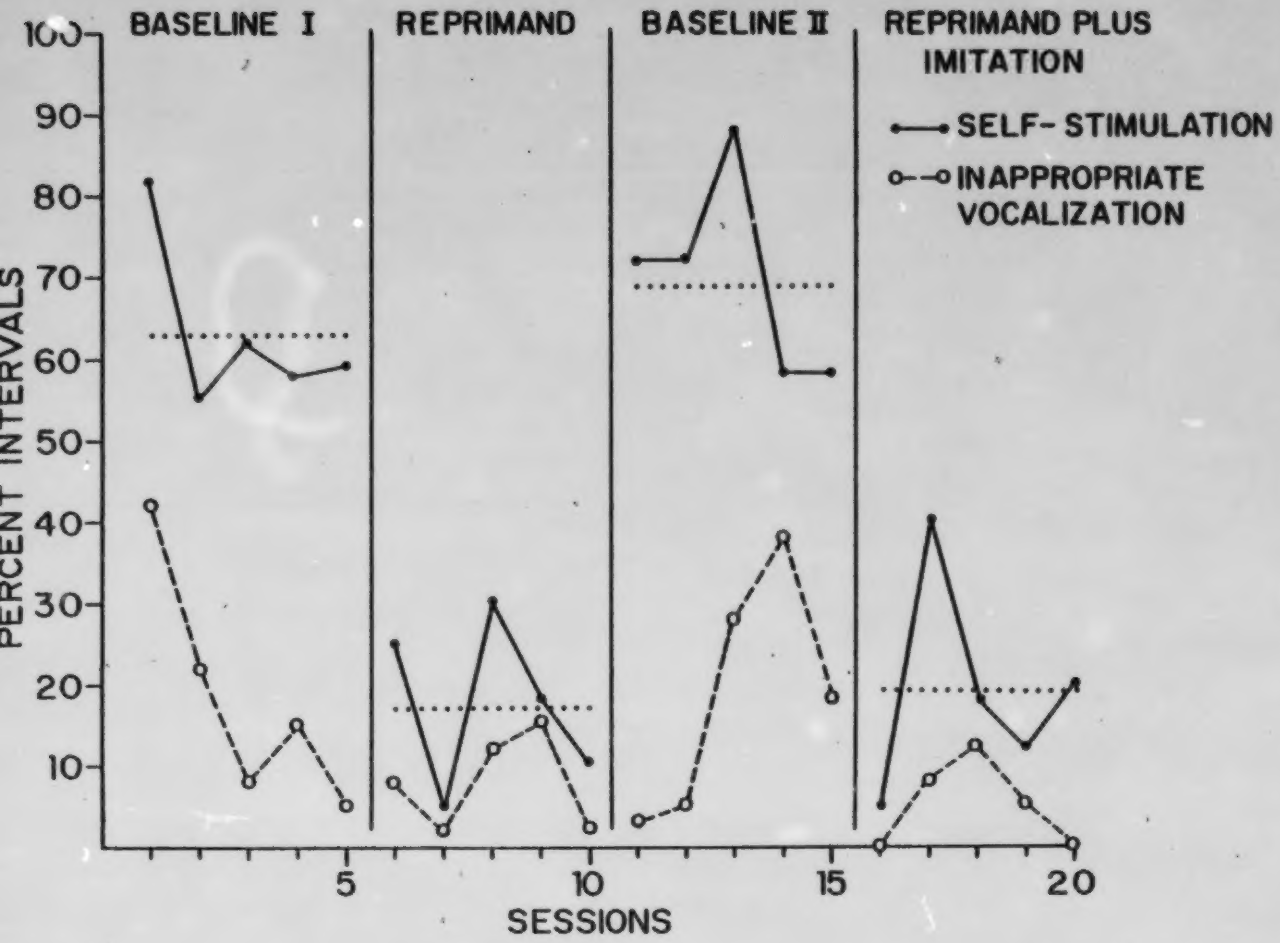

FIGURE 1
Self-Stimulation

APPENDIX E

APPENDIX E

Contingent Imitation in Teaching Academic Skills

James M. Kauffman and Judy Boland
University of Virginia

There is a great deal of research indicating that exceptional children can learn appropriate behavior through the use of modeling (Cullinan, Kauffman, & LaFleur, 1975). Several studies have demonstrated that contingent imitation can function as a positive reinforcer or as a punisher for children (Fouts, 1975 a, b; Fouts, Waldner, & Watson, 1976; Kauffman, Hallahan, & Ianna, 1977; Kauffman, LaFleur, Hallahan, & Chanes, 1975). Contingent imitation of children's spelling errors has been successful in improving spelling performances (Kauffman, Hallahan, Brame, Haas, & Boren, 1976).

The following studies assessed the effectiveness of contingent imitation in improving specific academic behaviors. In the first study, an imitation procedure was compared with a modeling procedure for effectiveness in improving handwriting skills. In the second study, three methods--modeling, imitation, and cognitive instruction--were compared for effectiveness in teaching a novel visual-motor response.

Study I

Subjects

The subjects were four seven and eight year old boys in a special class for disturbed children.

Procedure

The children copied a five-word sentence daily during individual training sessions and later wrote the same sentence during the regular handwriting period. Sentences written during the training sessions and those written during the later probe were scored each day. Points were scored for having the correct number of strokes for each letter, letter formation, placement, space between letters and words, letter order, and word order (See sample scoring sheet). Percent correct was recorded daily.

During baseline, the subjects were instructed to do their best and were praised for good work. During modeling sessions, the instructor had the child write the sentence, then showed the child how to write the sentence correctly and pointed out specific similarities and differences between the child's response and the model, and finally had the child write the sentence again. In imitation sessions, the teacher imitated the child's performance on the first trial, pointing out specific similarities between it and the correct model, then had the child write the sentence again.

Results

The teacher reported improvement in all four children's handwriting ability. The data (see attached figures) indicated some improvement over instructional sessions; however, there did not appear to be any clear advantage for either the modeling or imitation procedure.

Study II

Subject

The subject was a nine year old male in a classroom for behaviorally disordered children. He appeared to have some specific learning disabilities involving perceptual motor difficulties.

Procedure

The subject was instructed by a trainer in daily individual training sessions. Sessions were conducted for 20 minutes and involved the teaching of a novel visual-motor response (copying Chinese characters) using one of three methods: modeling, imitation, or cognitive-instructional. In modeling, the child was shown how to write the character and asked to imitate the teacher. In imitation, the child's performance was imitated by the teacher. In cognitive-instructional, the child was asked to observe all the parts of the character, trace them, and tell himself how to make them. Characters were randomly assigned to one of three methods, and the dependent variable was trials to the criterion of three successive correct trials.

Results

The study was terminated before completion because the school year ended. Data obtained indicated no significant differences among the methods.

References

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Fouts, G.T., Waldner, D.N., & Watson, M.W. Effects of being imitated and counter-imitated on the behavior of preschool children. Child Development, 1976, 47, 172-177.

Kauffman, J.M., Hallahan, D.P., Brame, T., Haas, K., & Boren, R. Improvement of spelling performance by contingent imitation of errors. Journal of Learning Disabilities, 1978, 11, 217-222.

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Kauffman, J.M., LaFleur, N.K., Hallahan, D.P., & Chanes, C.M. Imitation as a consequence for children's behavior: Two experimental case studies. Behavior Therapy, 1975, 6, 535-542.

Child Chris

Date 1/31/78

Condition Model Only-PROBE

Scorer JSB

letters and spaces	strokes		formation		placement		letter spacing		word spacing		Per wd. let. order		Per sent. wd. order		Total	
	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E
W	4	4	1	1	1	1					1	1	1	1	8	
							1	1							1	
e	2	2	1	1	1	1									4	
									1	1					1	
w	4	4	1	1	1	1					1	1			7	
							1	1							1	
e	2	2	1	1	1	1									4	
							1	1							1	
n	2	2	1	1		1									4	
							1	1							1	
t	2	2	1	1	1	1									4	
									1	0					1	
t	2	2	1	1	1	1					1	1			5	
							1	0							1	
o	1	1	1	1	1	1									3	
									1	0					1	
t	2	2	1	1	1	1					1	1			5	
							1	1							1	
h	2	2	1	1	1	1									4	
							1	1							1	
e	2	2	1	1	1	1									4	
									1						1	
s	2		1		1						1				5	
							1								1	
t	2		1		1										4	
							1								1	
o	1		1		1										3	
							1								1	
r	2		1		1										4	
							1								1	
e	2		1		1										4	
	25	25	11	11	11	11	7	6	3	1	4	4	1	1	62	59
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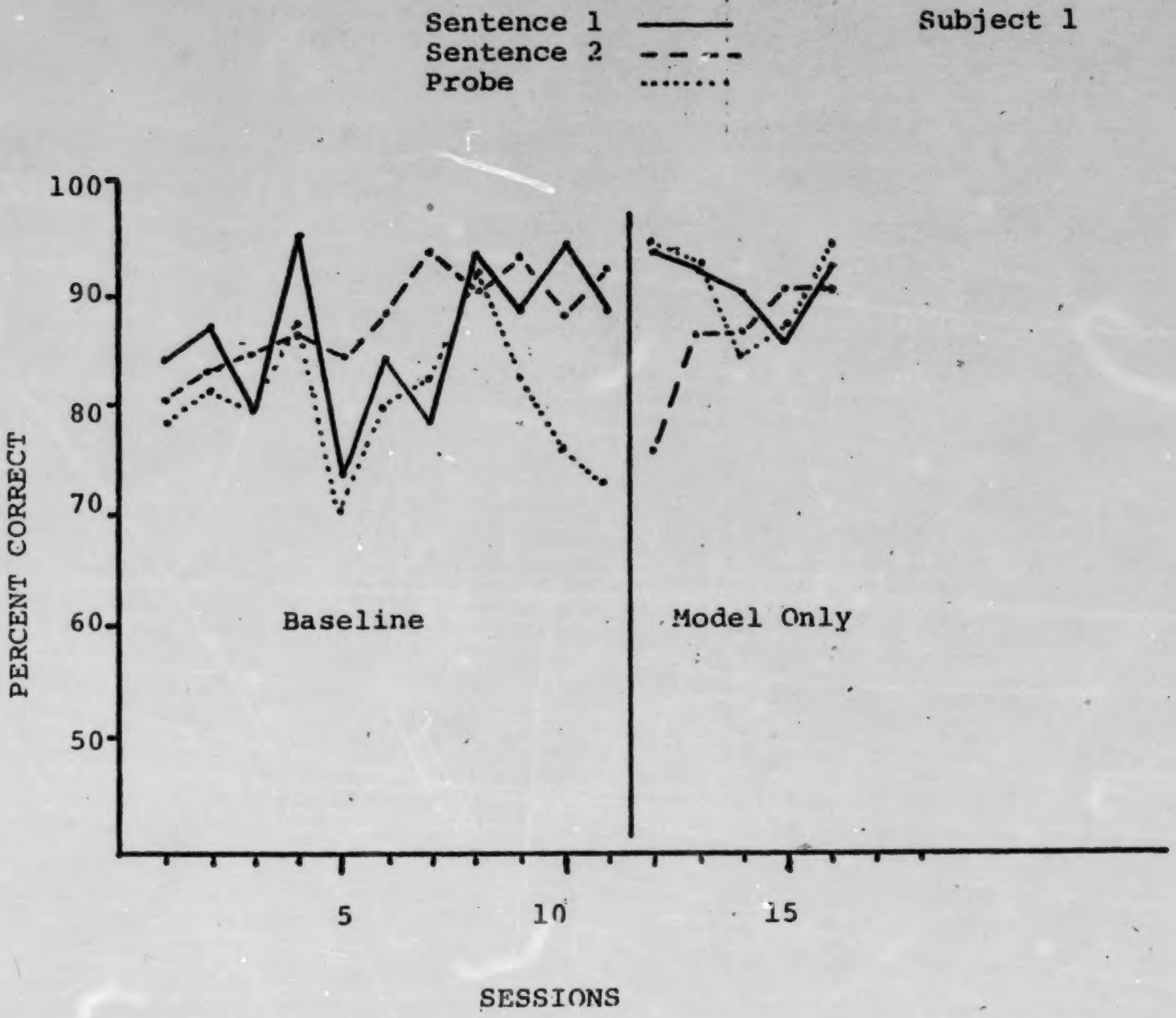

Sentence 1
Sentence 2
Probe
Subject 1
100
90
80
70
60
50
PERCENT CORRECT
Baseline
Model Only
5
10
15
SESSIONS

FIGURE 1

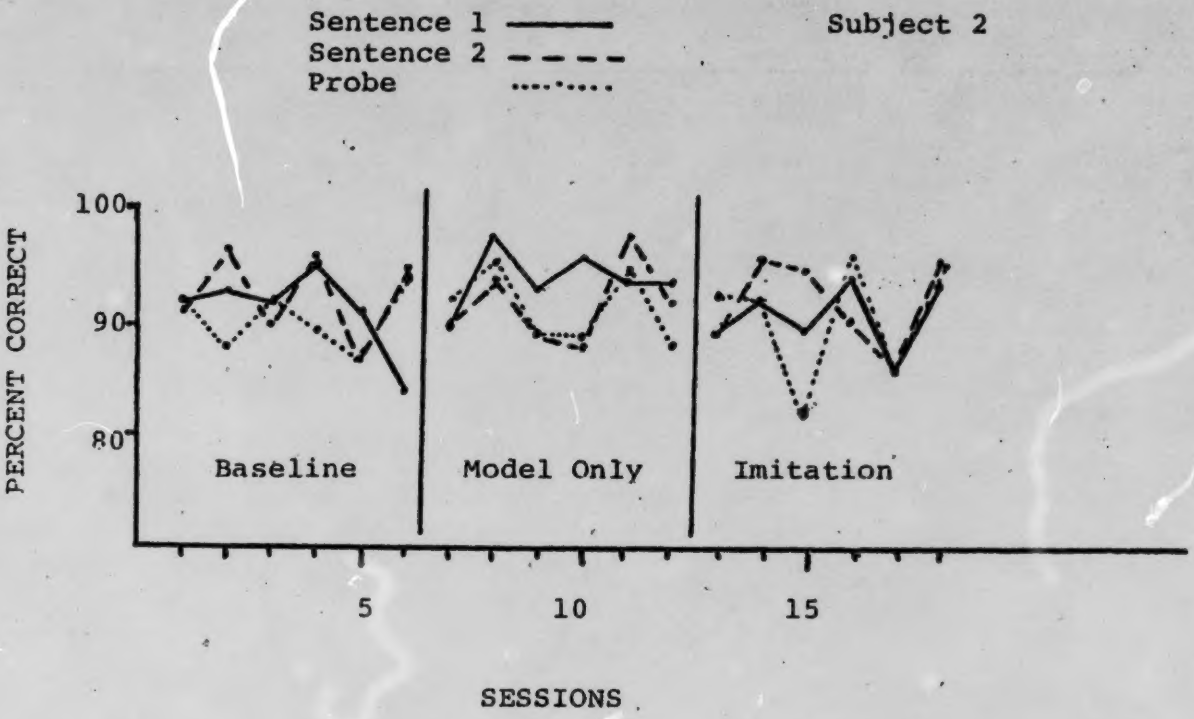

Sentence 1
Sentence 2
Probe
Subject 2
100
90
80
PERCENT CORRECT
Baseline
Model Only
Imitation
5
10
15
SESSIONS

FIGURE 2

E-6

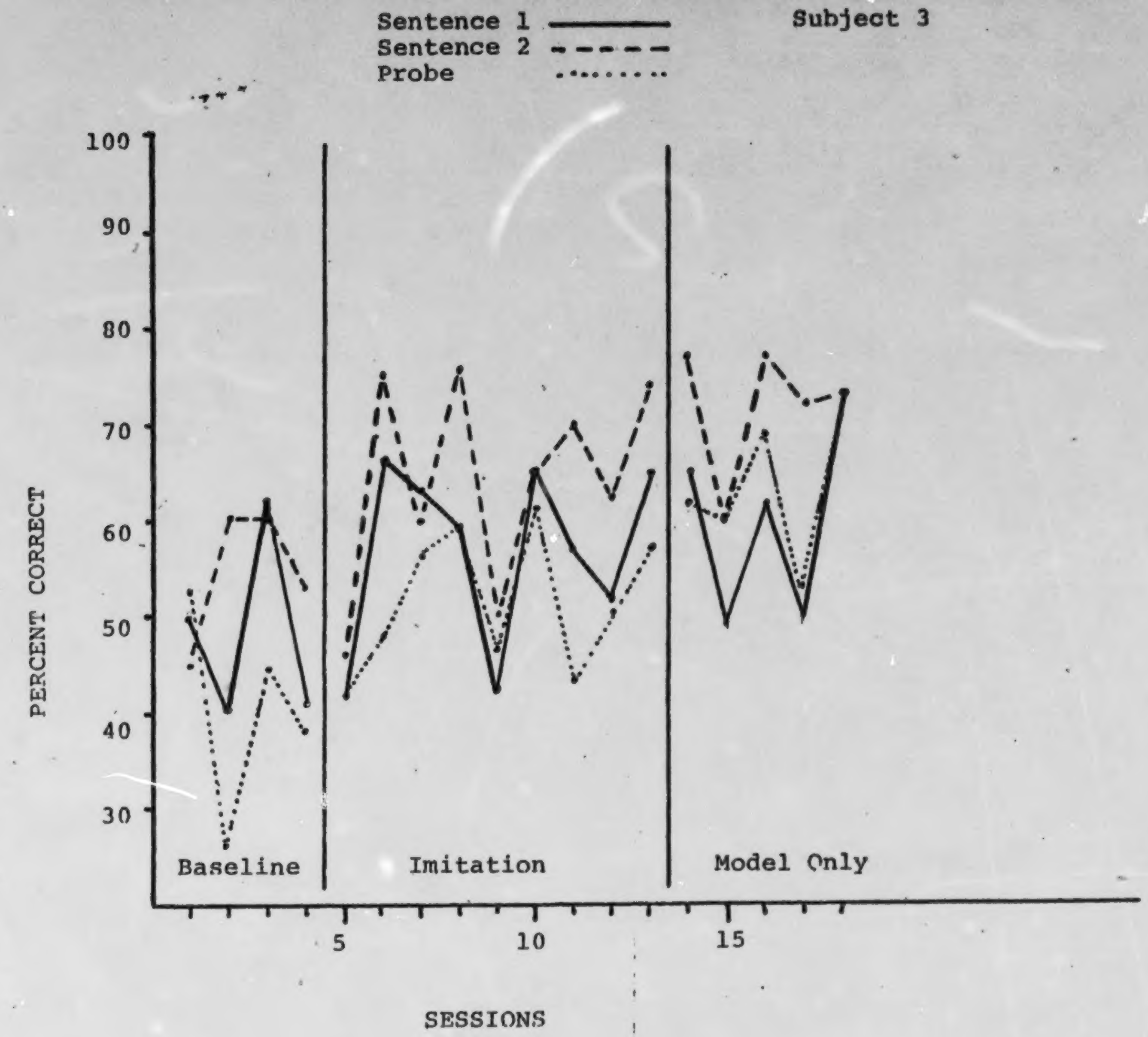

Sentence 1
Sentence 2
Probe
Subject 3
PERCENT CORRECT
100
90
80
70
60
50
40
30
Baseline
Imitation
Model Only
5
10
15
SESSIONS

FIGURE 3

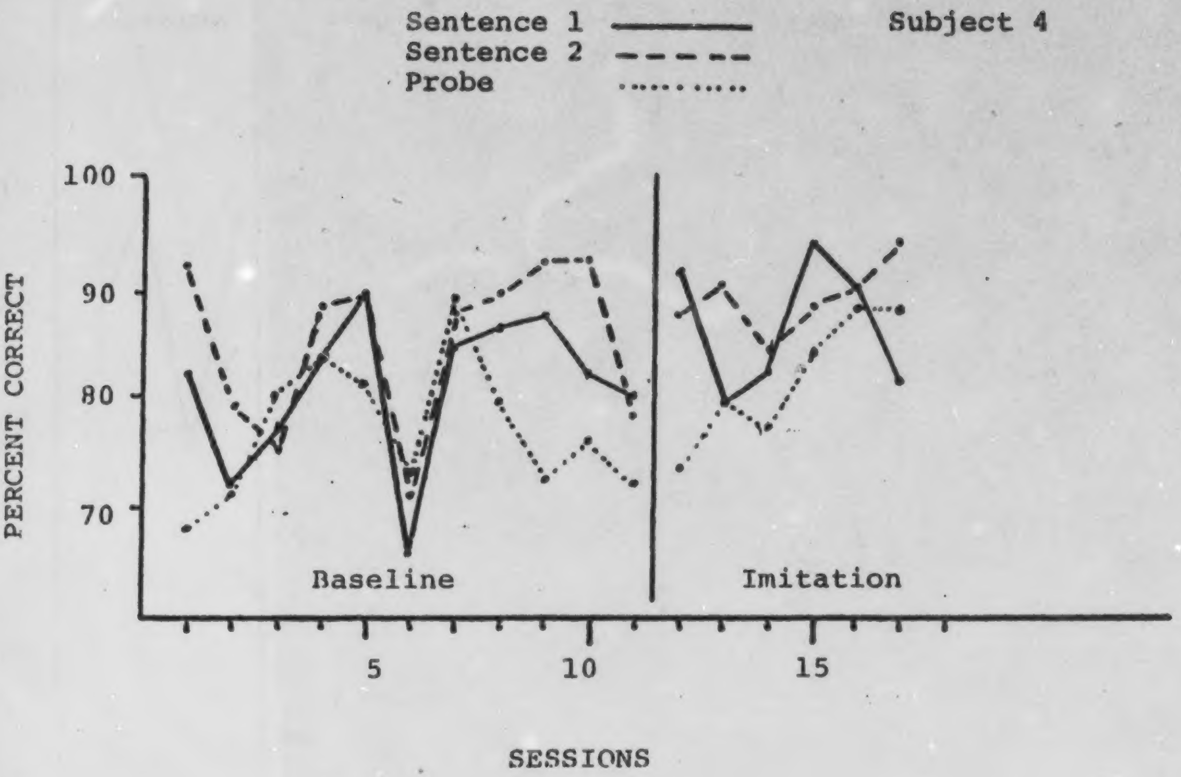

Sentence 1
Sentence 2
Probe
Subject 4
100
90
80
70
PERCENT CORRECT
Baseline
Imitation
5
10
15
SESSIONS

FIGURE 4

APPENDIX F

THE EFFECTS OF IMITATION ON THE ROCKING BEHAVIOR OF A SEVERELY RETARDED ADOLESCENT MALE

Hal R. Evans
People Places, Inc.
and
J. S. Birnbrauer[1]
DeJarnette Center for Human Development

Imitation as a consequence of behavior has been demonstrated to be both reinforcing and aversive (Kauffman, LaFleur, Hallahan & Chanes, 1975). As a method of decreasing inappropriate behavior it has the appealing qualities of being easy to carry out and acceptable to parents and the public. The purpose of the present study was to assess the effects of imitation of stereotypic or self-stimulatory behavior.

Client:

Donald is a 19 year old retarded male resident of the Adolescent Unit at Western State Hospital. On a recent Vineland Social Maturity Scale, he achieved a level of 2.8 years. He is non-verbal but follows simple requests and usually tends to his own toileting. He has been institutionalized since the age of five. Donald has a wide range of stereotypic behaviors that fill his free time and interrupt on-task behavior during structured activities. Various forms of handflapping and rocking occur at a high rate and were chosen as possible target behaviors. In addition, data were collected on fingerbiting.

The Effects of Imitation on the Rocking Behavior of a Severely Retarded Adolescent Male

Data Collection:

The behaviors were defined:

Rocking - moving torso forward and backward repeatedly three times or more; may or may not strike the back of the chair.

Flapping - non-functional repetitive movements of fingers three or more times; tapping thumb against fingers; holding an object (paper, twigs, etc.) between thumb and index or second finger and rapidly slapping the object with the third and/or fourth finger; rocking any object back and forth between thumb and any other finger; rapidly tapping fingers on other body parts such as head; flapping usually produces an audible sound.

Biting - placing thumb side of index finger or second finger of either hand in mouth and closing teeth around finger.

Data were collected using a 20-second continuous interval recording system. Intervals were monitored through the use of either a tape recorder or stop watch.

Procedure:

The study was conducted in two settings, Donald's dormitory and classroom. For approximately 40 minutes daily in the dormitory, Donald was given four fine motor tasks: bead stringing, geometric puzzle, geometric form cube, and a small pegboard. The dormitory activity was supervised by a Special Education practicum student from James Madison University. Data were collected by an observer for 30 minutes. On some days, data were also collected by the practicum student for reliability purposes. Following a short break after the dorm session, Donald attended school in another building on the grounds. Data were collected during the first task, placing pegs in a large pegboard, by both the observer and practicum student for 10 minutes. The school task was conducted by his regular teacher.

After ten baseline sessions, imitation of rocking was begun in the dormitory only. If imitation of rocking was found to have an effect, this design would allow us to assess generalization to the classroom. If imitation had an effect on Donald's behavior in the dorm, but did not generalize to the classroom, the plan would allow us to test the effects of imitation again in the classroom.

During the imitation condition, whenever Donald rocked, the instructor copied his rocking until Donald ceased, at which time the instructor prompted him to return to the desk.

Results and Discussion:

Inter-observer agreement was calculated in both settings on all three behaviors. The total number of agreements (by interval) was divided by agreements plus disagreements and multiplied by 100. Reliability during baseline never averaged less than 86% in either setting. Reliability during imitation was unobtainable in the dormitory due to the fact that the instructor's time was absorbed by imitating Donald's rocking behavior.

The Effects of Imitation on the Rocking Behavior of a Severely Retarded Adolescent Male

Results are depicted in Figure 1. Sessions 1-3 were practice sessions and are not shown. Sessions 4-10 were baseline, and 11-16 were imitation of rocking in the dormitory. The rate of rocking remained essentially the same in both phases on the dormitory. Coincidentally, the rate of rocking decreased in the classroom at the beginning of the imitation phase in the dorm. Mean rates of rocking in the class were 37% and 26% in each phase. Flapping increased slightly in the dorm and remained at 21% in both phases in the class. The rate of fingerbiting increased from a mean rate of 1.8% to 11.1% during imitation of rocking on the dormitory and decreased from 13% to 8.1% in the class during this time. As Figure 1 indicates, however, fingerbiting was a highly variable behavior, and it is unclear what may have caused these changes in rate.

Since it is clear that imitation was not effective in reducing rocking, the project was discontinued. During imitation Donald reacted by watching the instructor intently; he stared at the instructor and occasionally appeared to be amused. Thus, there was no doubt that Donald noticed the instructor's rocking. In the final (17th) session we tried encouraging rocking. Not only did the instructor imitate, but he also verbally encouraged Donald to rock. The rate of rocking increased greatly, and Donald appeared to be upset by the instructor's actions. Time did not permit testing to determine how Donald would react to continued use of encouragement and imitation.

The Effects of Imitation on the Rocking Behavior of a Severely Retarded Adolescent Male

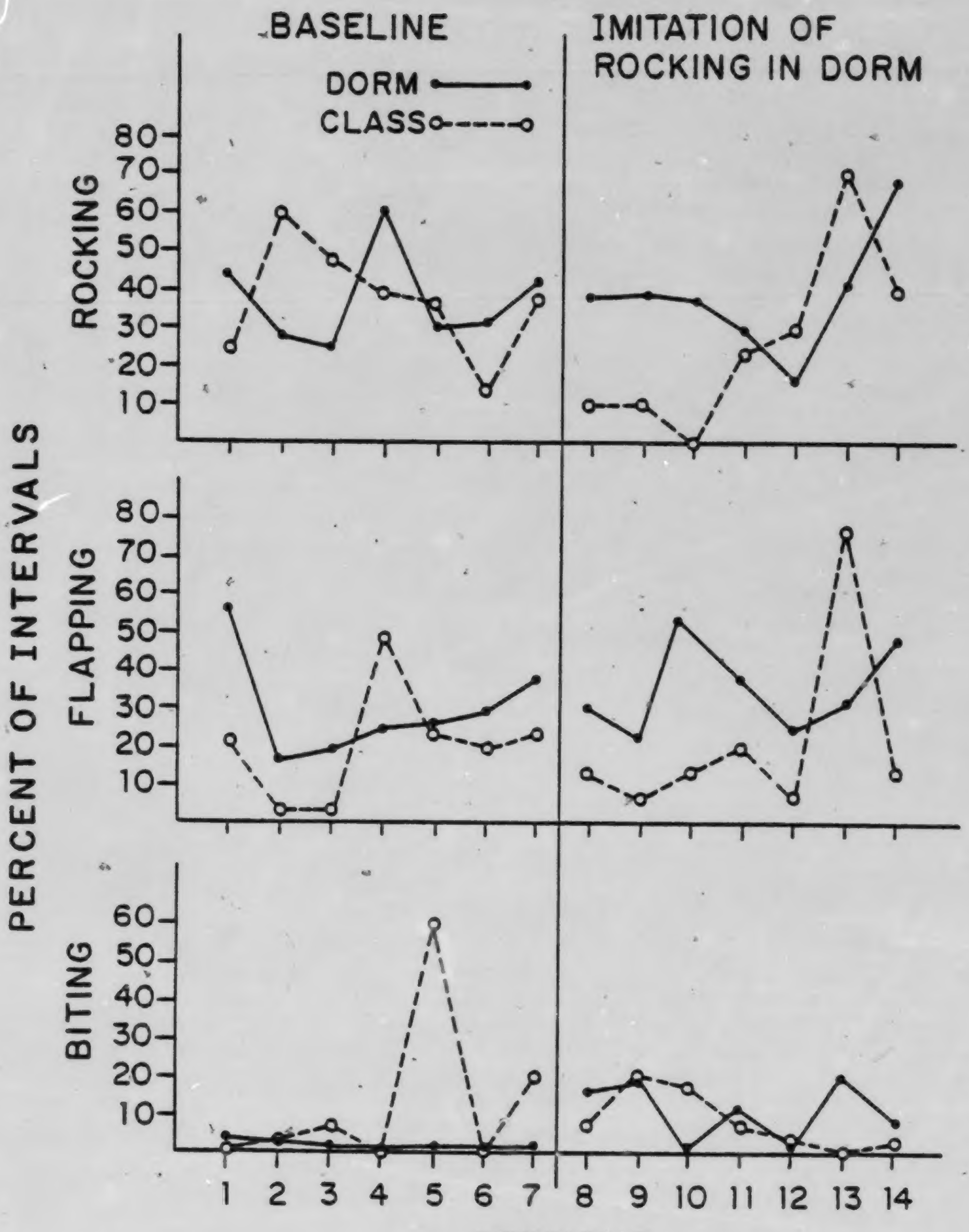
REFERENCE

Kauffman, J. M., LaFleur, N. K., Hallahan, D. P. and Chanes, C. M. Imitation as a consequence for children's behavior: two experimental case studies. *Behavior Therapy*, 1975, 6, 535-542.

FOOTNOTE

1. We wish to thank Frank O'Brien for serving faithfully as the instructor and imitator in the dormitory and observer in the classroom. Also, we would like to thank Steve Ellis, the classroom teacher, and Bruce Bundy, the supervisor of Donald's dormitory, for calling Donal[illegible] behavior to our attention and making the study possible. Hal R. Evans' address:
24 W. Beverley Street, Staunton, Virginia 24401.

FIGURE 1


BASELINE
IMITATION OF ROCKING IN DORM
DORM
CLASS
PERCENT OF INTERVALS
ROCKING
FLAPPING
BITING
80
70
60
50
40
30
20
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
SESSIONS

APPENDIX G

APPENDIX G

Effects of Contingent Eye Contact and Imitation on Stereotypic Behavior

Jay S. Birnbrauer and Nancy Hopkins
DeJarnette Center for Human Development

James M. Kauffman
University of Virginia

Previous research has not clearly indicated that imitation alone is an effective decelerating consequence. That is, imitation has been preceeded by or paired with other consequences (e.g., reprimands, time out) that may account for its effects. The purpose of the present study was to evaluate contingent imitation as a decelerating consequence without introducing other decelerating events concurrently.

Subject and Setting

The subject was a 9-year-old psychotic girl in residence at DeJarnette Center for Human Development. She exhibited high rates of stereotypic tapping behavior in most situations. Tapping was done with her fingers or objects, i.e., she used her fingers to tap objects or parts of her body or used one object to tap another.

The setting was a small classroom at DeJarnette Center. The room was furnished with a small work table, chairs, and a variety of toys. During experimental sessions the observer(s) sat in the classroom at a location that allowed a clear view of the teacher and the child during work and play activities.

Procedure

Experimental sessions were approximately 20 min. in length. The teacher brought the child to the classroom and seated her at the table. Simple tasks (e.g., putting large pegs in a peg board or taking them out, completing simple puzzles) were presented and the child was reinforced for task performance. After completion of the task the child was allowed to go to another table and play freely with toys and books. The teacher stayed near the child during play sessions, which lasted about 5 min. After 5 min. of play the child was returned to the work table to complete another task. The observer(s) coded tapping using a 10 sec. continuous record system cued by a cassette tape equipped with ear plug(s).

During baseline sessions the teacher made no response to the subject's tapping. During intervention sessions, contingent responses to tapping were made during play time only. After obtaining baseline data for four days, the teacher provided contingent eye contact for three days. For contingent eye contact, the teacher bent over and placed her face within two inches of the child's for 5 sec. or until the tapping stopped. During sessions 8-24, contingent imitation of tapping was added to eye contact, i.e., the teacher not only placed her face close to the child's but also tapped imitatively for 5 sec. or until the child stopped her tapping. No comments about tapping were made to the child in any of the sessions. During sessions 25-31, contingent imitation was discontinued and eye contact was used alone. Baseline conditions were in effect for two subsequent sessions, and contingent imitation and eye contact were reinstituted for the last five sessions (34-38).

Results and Discussion

A second observer recorded tapping behavior during four sessions. Observer agreement (agreements/agreements & disagreements x 100) was 84, 96, 83, and 87 percent for the four sessions. As shown in the attached figure, eye contact did not reduce tapping appreciably compared to baseline. Following an initial session in which there was no change from baseline (session 8), tapping declined during the first eye contact plus imitation phase to about one-fourth its baseline level. Discontinuation of imitation and eye contact did not result in a dramatic recovery of baseline levels of tapping, although a change in the downward, therapeutic trend during eye contact plus imitation was noted. Reinstitution of eye contact plus imitation during the final phase of the study appeared (with the exception of the last day's data) to further reduce tapping.

Although these data suggest the possibility that contingent imitation served to suppress stereotypic tapping, we can not have much confidence regarding the conclusion that imitation was effective, since the changes in tapping associated with introduction and removal of the contingency were not dramatic. Failure to recover anything approaching initial baseline levels of tapping behavior during the second eye contact and baseline phases was particularly disappointing. We were unable to identify any variables that could account for failure of tapping to resume its initial baseline rate. Unfortunately, institutional decisions following Birnbrauer's return to Australia precluded our continuation of the study beyond session 38.

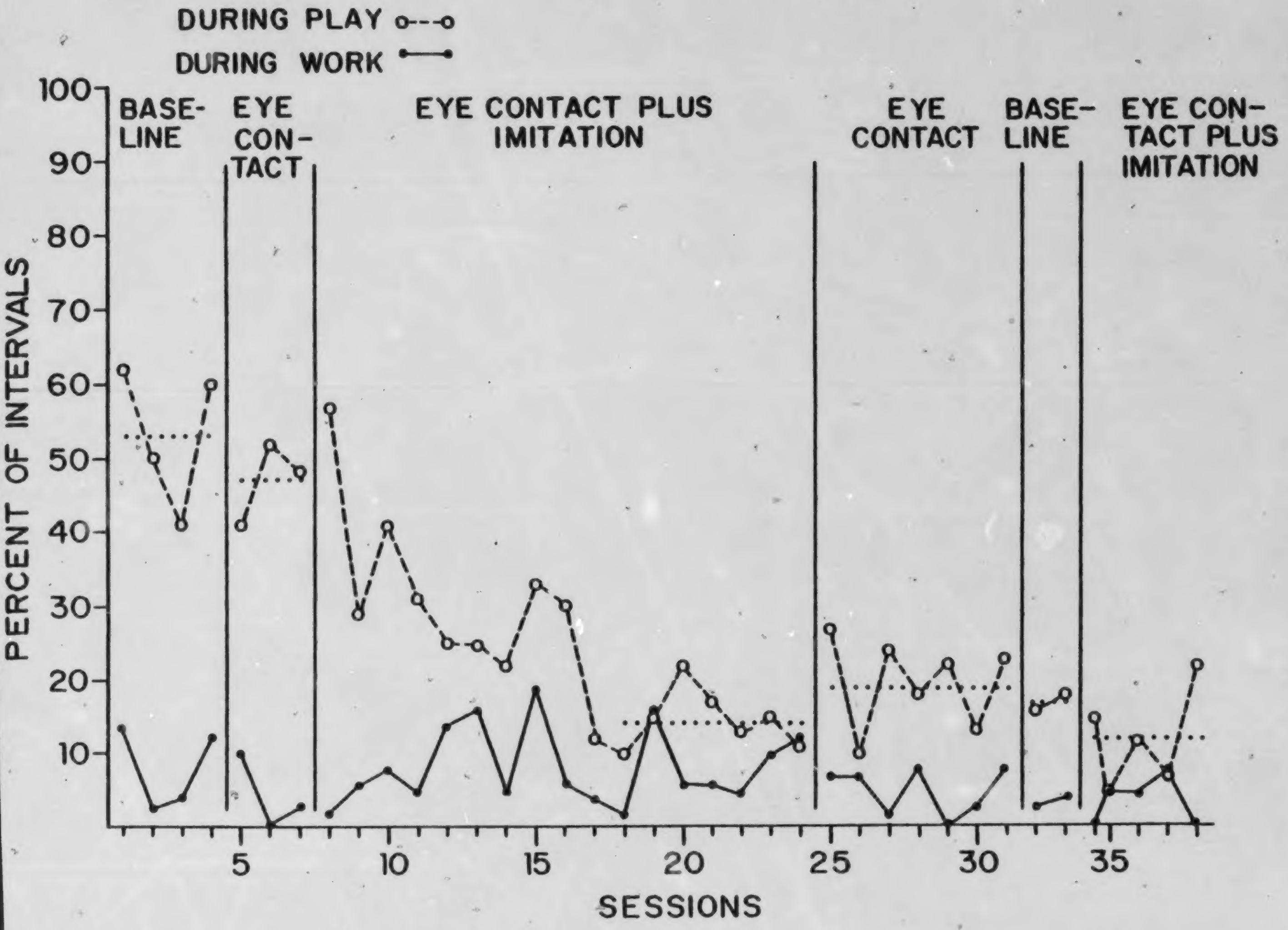

DURING PLAY o--o
DURING WORK •—•
BASE-LINE
EYE CON-TACT
EYE CONTACT PLUS IMITATION
EYE CONTACT
BASE-LINE
EYE CON-TACT PLUS IMITATION
PERCENT OF INTERVALS
100
90
80
70
60
50
40
30
20
10
5
10
15
20
25
30
35
SESSIONS

FIGURE 1

submitted for publication

APPENDIX H

Effects of Contingent Imitation and Functional Equivalence on the Behavior of Retarded Children

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SUMMARY

Four trainable mentally retarded children were seated individually at a box with seven holes in the top surface. Six of these holes had a picture of an animal next to them; these holes were used by the confederate and the subject. The seventh hole (center position) had no animal picture and was only used by the confederate. Three experimental conditions were arranged: Baseline (first session)--Subjects dropped the 24 marbles into any of the six animal holes; Imitation (two consecutive sessions)--the confederate copied the subject's behavior if he chose a target hole; Functional equivalence (two consecutive sessions)--the confederate made the appropriate animal sound if the subject selected the target hole. As expected, the subjects selected the target hole about equally often under both imitation and functional equivalence conditions. The findings were discussed in terms of a stimulus congruency hypothesis.

INTRODUCTION

The last decade has seen an increasing number of studies concerning the effects of contingent imitation on the imitative and nonimitative responses of children and youth (2,3,4,5,7,8, 9,10,12). Except for the studies of Kauffman and his associates, most studies used a marble dropping device or telephone dial for the experimental task. These tasks allowed subjects to demonstrate a limited number of topographically alternative responses. During an imitation condition, the experimenter typically copied the child's response if he demonstrated a preselected target behavior (i.e., dropped the marble in a specific hole); the experimenter selected a hole different from that of the child if he (the child) did not select the target hole. The rate of the target responses under the imitation condition was then compared with those obtained under other, control conditions. The experimental conditions employed included those in which the experimenter (a) provided no feedback (e.g., baseline condition), (b) imitated the child on a predetermined schedule (sometimes a yoked control), (c) displayed a variety of other topographically dissimilar behaviors (extinction condition), or (d) demonstrated a topographically opposite behavior (contra-imitation condition) if the child emitted the target response. In one study (5) of vocalizations in infants, the rate of the target behaviors under the condition of imitation was compared with those obtained under conditions in which contingent food delivery or physical contact was used.

In spite of the reported methodological inadequacies (12,13, 14) of some of these studies, the results of all of them have been interpreted as demonstrations of the reinforcing or punishing function of contingent imitation. It has already been pointed out that the findings of some experiments (1,3,10,12) allow equivocal interpretations (13). The position taken here is that the design of these studies also did not necessitate the conclusion that contingent matching results in a higher rate of the target response than nonmatching when matching and nonmatching are defined in terms of response topography. In all control conditions in which contingent feedback was used (extinction, yoked control, contra-imitation), nonmatching was procedurally defined as the experimenter giving a topographically different response from that of the subject if the latter one selected the target response. Consequently, it could be that what these studies have demonstrated is that the adult's systematic selection of the same response as the one selected by the subject caused him to repeat this behavior at a higher rate than the adult's systematic selection of another alternative response. Another definition of contingent nonmatching could include the adult's systematic demonstration of a topographically different response from that of the subject but referring to the same (target) response selection (i.e., a "functional equivalence").

The present study investigated whether response contingencies consisting of topographically matching responses would result in a higher rate of that behavior than contingent nonmatching (functional equivalence) referring to that behavior. It could be true that the implied reference (semantic congruence) of the adult's behavior rather than the topography of the subsequent response of the adult is the relevant controlling variable. Conversely, it could be that behavioral similarity is the controlling variable.

METHOD

Subjects and Experimenters

Four trainable mentally retarded children (three boys and a girl) from a local community center in the Netherlands participated. Their ages ranged from 68 to 89 months. Subjects were selected on the basis of availability and their ability to associate six animal sounds with corresponding animal pictures. (IQ scores were not made available.)

Two adult females served as experimenter and as confederate. The experimenter escorted the children back and forth to the experimental room, explained the game they were going to play, and recorded responses. The confederate carried out the programmed response contingencies.

Apparatus

A box (28 x 28 x 14 cm) with seven holes was used. Six of these holes formed a circle 24 cm in diameter. Next to each of these six holes was the picture of an animal (a dog, a cat, a chicken, a frog, a cow and a bee). The holes formed the mouths of the animals. The seventh hole had no animal picture and was located in the center of the circle. The children and the confederate were given marbles which they could drop into any of the six holes. The seventh (center) hole was used by the confederate only.

Experimental Design

Three experimental conditions were arranged (baseline, imitation, and functional equivalence). The three conditions were implemented in a multiple baseline fashion (6) for each subject. Each subject received five sessions of 24 trials. The baseline condition was used during the first session. Each of the other conditions was used during two subsequent sessions, counterbalanced across subjects, i.e., either during the second and third or during the fourth and fifth sessions for a given subject.

For each subject the selection of the target hole to be used in the subsequent session (during the same or the following condition) was based on his/her performance in the previous session. A hole could serve as the target hole only if (a) it had not been used as the target hole in any previous session and (b) the subject previously had dropped a chance number of marbles in it.

Procedure

At the beginning of the first session, the experimenter told the child to sit in front of the apparatus so that he/she could play a game of feeding animals. She also informed him that the confederate (sitting next to the subject) was allowed to participate. Twenty-four marbles were given to the subject one at a time. Marbles dropped by the subject into the center hole (which seldom occurred) were returned by the experimenter. Following each trial the experimenter recorded the hole selected by the subject.

During the baseline session, the confederate remained seated next to the child but provided no feedback. The purpose of this condition was to assess whether or not the child had a preference for one or more of the six holes. If a preference was apparent, the experimenter selected a nonpreferred hole as the target hole; if not, the experimenter was free to select any hole to serve as the target hole during the next session.

During the imitation condition, the confederate copied the subject's response if he dropped a marble into the target hole. If the child dropped his marble into other than the target hole, the confederate always dropped his marble into the center hole. During the functional equivalence condition, the confederate made (three times in succession) the sound of the animal if the subject used the target hole. For example, the confederate would say, "Bzzzz-bzzzz-bzzzz" when the child dropped his marble into the target hole (bee). If the subject used another hole, the confederate always said, "Am-ster-dam". Each session of both conditions, the experimenter explained the contingency the first two times a subject used the target hole. For example, during the imitation condition the experimenter would say, "Each time you drop a marble into this hole, she (pointing at the confederate) will drop one in here too".

RESULTS

Examiniation of the baseline data revealed that the subjects had a tendency to use the three holes closest to them significantly more often (Binomial test, $z = 2.96$, $p < .01$) than the three other, more distant holes. The mean frequencies for the high and low preference sets were 5.25 and 2.75 respectively. The position preferences were consistent across experimental conditions.

Nonparametric tests (Wilcoxon tests for related samples) were used to compare the frequencies of the target and nontarget holes. Two types of comparisons were made, i.e., comparisons between the frequency of use of the target hole and other holes during the same condition, and comparisons of the frequency of use of the same hole when it was and when it was not the target hole.

Comparisons between the frequencies of selection of the target hole and nontarget holes required that the high and low preference sets be taken into account. Therefore, these comparisons were based on the observed frequency of use of the target hole and the averaged frequency of the two other holes of the same (high or low) preference set. The findings indicated that the subjects used the target holes significantly more often than the other holes of the same set during the imitation (T=5, N=7, p=.016) and the functional equivalence (T=5,N=8, p=.039) conditions. Comparisons between the frequencies of selection of the same hole across conditions suggested that only during the functional equivalence condition did subjects use the target hole significantly more often than either before (T=3, N=8, p=.020) or after (T=1, N=6, p=.031) that condition. Additional observations, furthermore, indicated that three of the four subjects tended to use the same hole quite frequently during the session following the one in which it had served as target hole. Especially during the second session of the same condition, these subjects continued to use the target hole of the first session at a high rate or even at a higher rate than the new target hole. In one instance, a subject tripled the rate of using the hole in a session subsequent to the one in which it had served as the target hole. This persistence effect disappeared when the next contingency (experimental condition) was introduced.

Although analysis of the mean frequencies (Table 1) suggested that contingent imitation had a rather mild effect on the subjects' use of the target holes, the findings might be interpreted differently when viewed from another perspective. The controlling effect of each condition was expressed in the proportion of times subjects used the target holes above chance level. Based on the binomial distribution ($p=.115$ for the low preference and $p=.219$ for the high preference holes), it was assumed that an effect was demonstrated if during any session of a condition the observed frequency of choice of a low or high preference hole was equal to or higher than 6 or 9 respectively ($p <.05$). The results indicated that the target hole frequencies exceeded these values four out of eight times (50 percent) under the imitation condition and five out of eight times (62.5 percent) under the functional equivalence condition. By contrast in only seven out of the 104 opportunities (6.73 percent) did nontarget holes have frequencies significantly above chance level. In six of these seven cases, these holes had been used as the target hole in the previous session.

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Insert Table 1 about here

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DISCUSSION

The results of the present study suggest that the effects of contingent imitation on a preselected target behavior in normal children may be extended to retarded children as well. The obtained findings also indicate that, as with normal children, the target behavior of retarded subjects was not controlled by nonimitation responses not referring to this behavior. But, the present observations also suggest that contingent nonimitative responses referring to the subjects' target behaviors (i.e., functional equivalence) controlled the rates of these behaviors at least as effectively as the imitative responses. Because the adult's response always followed the subject's response, it may be concluded that both response contingencies (imitation and functionally equivalent animal sounds) had similar effects.[2] Similar findings have been reported by Lamal (9). The nonimitative responses used in that study (verbal and nonverbal approval) typically signify the correctness or the appropriateness of the subject's response.

Previous studies (12,13) included speculations about why contingent imitation might lead to the observed effect. One possibility is that contingent imitation may create a sense of control on the part of the subject and, hence, satisfy an effectance motive (11,12,15). In the present study, however, a subject could control the adult's behavior just as effectively by using either the target hole or a nontarget hole under each of both (imitation and functional equivalence) conditions. Another possibility is that the adult's imitative responses may imply that the subject's response was "correct" or "appropriate" (12). If such an assumption is tenable, it might be expected that it would hold even more so for the programmed functionally equivalent responses. Especially during the initial trials of the functional equivalence condition, some children would say "right" or nod affirmatively when, follwoing the target response, the adult made the animal sound associated with the picture. Also, the children would say, "No", "wrong" or "stupid" when the adult said "Am-ster-dam" following their selection of a nontarget hole.

Another speculation made here is that because the imitative and functionally equivalent responses referred to the subjects' target behavior, both conditions may be regarded as components of a same class, i.e., that of stimulus congruency. In this light, imitation may be classified as topographical and the animal sounds associated with the animal pictures as semantic congruency. If it can also be assumed that (a) stimulus congruency will serve as a reinforcer when a task setting is conducive to "random" or "chance level" performance, and (b) that congruence of the subject's and the experimenter's behavior is an acquired stimulus value resulting from previous reinforcement histories, additional predictions can be made concerning the controlling effects of these conditions. For example, it would be expected that contingent imitations would not control the behaviors of children who are unable to imitate others or to perform simple match-to-sample tasks. Likewise, it would not be expected that the contingent demonstration of animal sounds will control the target responses of children who have not learned to associate the animal sounds with the corresponding pictures or when using inappropriate animal sounds with children who have learned the correct association.

Present findings also indicated that three of the four subjects continued to use the target hole at about the same rate or even at a higher rate during one or more sessions when a previous target hole no longer served as the target hole. Similar findings have been reported by Fouts and his colleagues (2,3,4). The design of these studies allowed speculations concerning this phenomenon in terms of intermittent reinforcement schedules or the subjects' attempts to re-establsih behavioral similarity. The design of the present study did not allow for these mechanisms and yet the same phenomenon occurred under both the imitation and the functional equivalence conditions. Therefore, other explanations seem to be in order, especially since it was observed that subjects continued to select the target hole used in a previous session even after being reinforced a number of times for using the new target hole.

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Footnotes

1. Requests for reprints should be sent to the first author, Department of Developmental Psychology, University of Leiden, Hooigracht 15, 2300 RA Leiden, The Netherlands. Preparation of the manuscript was facilitated by Grant No. G007701821 from Bureau of Education for the Handicapped, United States Office of Education, Department of Health, Education and Welfare.

2. Since the confederate always made the same response whenever a subject selected a nontarget hole within conditions, the cueing functions of the confederate's imitative responses and animal sounds could not be analyzed.

Table 1

MEAN FREQUENCIES OF CHOICE OF TARGET HOLE AND OTHER HOLES DURING EXPERIMENTAL CONDITIONS

	IMITATION		FUNCTIONAL EQUIVALENCE	
	Target Hole	Other Holes	Target Hole	Other Holes
BEFORE	3.20		3.90	
DURING	6.88	2.50	9.00	3.50
AFTER	5.42		5.67	

submitted for publication

APPENDIX I

The Effects of Vicarious Prompting on Attentive Behavior of Children with Behavior Disorders

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University of Virginia

Running Head: Vicarious Prompting

Abstract

Vicarious prompting, reinforcing and labelling the appropriate behavior of a nontarget child contingent on inappropriate behavior of a target child, was assessed in two classrooms of children with behavior disorders. Vicarious prompts using social reinforcement alone were clearly effective in increasing the attentive behavior of one target child in the first class. Members of the replication class, however, did not appear to be responsive to vicarious prompting. Comparison of the two groups suggests that vicarious prompting, a relatively subtle indirect control technique, may be a low cost, positive, and effective alternative to other techniques under conditions in which the behavior of most of the group is attentive.

We often employ techniques of behavioral control that make sense intuitively and that casual observation seems to indicate are effective but which have not been subjected to experimental analysis. Experimental analyzes may indicate whether the techniques affect the rate of behavior in the direction and to the extent we imagine and reveal the circumstances under which the techniques are to be recommended. One such intuitively appealing but unanalyzed technique is vicarious prompting, i.e. calling attention to and praising and perhaps tangibly reinforcing the appropriate behavior of one youngster while another is misbehaving with the explicit intent of prompting the miscreant (target child) to behave appropriately as well. For example, a teacher who has observed Jimmy pushing and shoving in line may say to Johnny, "Since you are standing quietly and not bothering your neighbors, you may go first if you'd like". Prompting in this way very often has the desired immediate effect upon the target child's behavior, e.g., Jimmy ceases bothering his neighbors. In addition, it is economical, easy to use, and consistent with behavioral principles, since misbehavior is not being reinforced in any obvious way but appropriate behavior is described, modeled by the other child, and reinforced; and if the vicarious prompt is successful, the target child's appropriate behavior may be reinforced. On the other hand, the prompt, though indirect, is response contingent attention and could serve to strengthen inappropriate behavior similarly to direct attention or reprimands from the teacher (Becker, Thomas, & Carnine, 1969).

The purpose of this study was to assess the effects of vicarious prompting on the classroom behavior of children classified as emotionally disturbed. Data were recorded in such a way as to measure the effects of prompting not only upon the target child (i.e. the child whose misbehavior occasioned the teacher's intervention) but also upon other students. These data provide an extension of studies which have reported the spread of effects of reinforcing one child's behavior to his/her neighbor, i.e., "vicarious reinforcement" (Broden, Bruce, Mitchell, Carter & Hall, 1970; Kazdin, 1973; Kazdin, Silverman, & Sittler, 1975). Studies of vicarious reinforcement have been conducted with retarded rather than disturbed students. Furthermore, in these studies vicarious effects were measured under rather unusual circumstances, such as the teacher's delivering very little or no approval to the target students during baseline and avoiding direct reinforcement of the observing students during vicarious reinforcement phases. The rate of reinforcement during baseline would seem to be an important parameter to assess, as would the response contingent nature of the vicarious prompt.

In the present study, the teacher was instructed to reinforce children socially and with tokens and to employ other tactics that she thought might succeed during baseline. Thus, the question was: If a teacher is reinforcing appropriate behavior at a high rate and ignoring or timing-out inappropriate behavior, is there further advantage in employing vicarious prompting?

METHOD

Subjects

Two classes, one in time telling ("Time Class") and one in monetary equivalents ("Money Class"), were organized especially for this study. The Money Class, a replication, is described briefly in Discussion, since the nature of the results does not warrant a detailed presentation. Children were selected from the population of DeJarnette Center for Human Development, a residential treatment center for children with behavioral disorders, on the basis of test results in time-telling and their class schedules. Only children who could choose an elective during the selected period were eligible. The children were asked if they wanted to attend a special class to learn to tell time, and attendance each day was optional.

The Time Class had five members, one of whom, the only girl, dropped out during the baseline phase. The remaining four boys were between 9-0 and 13-6 years of age, with I.Q. test results within the mildly retarded to low average ranges. Two were diagnosed as "Hyperkinetic Reaction" and two as "Unsocialized Aggressive Reaction". All of these children recognized numerals to at least 60 and distinguished the hour and minute hands on a clock face. Two correctly labeled some times, e.g., the hour and half-hour; two recognized no times. None could set a clock to a specified time.

Selection of target children was based on rates of talking out and out-of-space recorded during the baseline phase. At the same time, we chose to secure more data on fewer children rather than to sample every child's behavior less frequently. Therefore, we discontinued recording the behavior of the best behaved child in the group and collected data on only three of the four members of the Time Class.

Setting

The experimental classroom was 3.8 x 3.4m with a one-way observation window extending the length of one wall. The room was equipped with a large half-moon shaped table, chairs, and in two corners chairs which were used as in-class time out areas (known by the children as "free chairs"). The children sat in a semi-circle around the table and the teacher sat facing them. All the children were within easy reach and equidistant from the teacher. At the teacher's right hand was a small table where the children placed "things you've brought to class which might get you in trouble if you play with them during class". Another table was used as the token store. Store items included pennies, edibles (e.g. pretzels and cookies, water), and a bag from which the children could select a trinket when they attended class for five days in succession. An attendance chart, menu (1 chip = 1 peanut, 3 chips = 1 potato chip, 10 chips = 1 penny, etc.), and rules [(1) "Raise your hand before you talk", and (2) "Stay in your own space"] were posted on the wall. The teacher also had a push button (under the table out of sight of the children) which she pressed whenever she prompted vicariously. The resulting light flash in the observer area was to insure that all vicarious prompts were recorded.

The observers, usually two and sometimes three, were stationed outside the room and recorded behavior continuously at 10 second intervals. A tape recorder wired into the sound system from the classroom signaled the intervals to the observers.

The Time Class ran from February to June four mornings per week from 8:30 to 9:20 and the replication from April to June five days per week from 10:10 to 11:00 a.m.

Procedure

The teacher met the children in a central location and escorted them to class. On entering the class, the children deposited items that they had carried to class on the table provided and took their seats, at which time the teacher marked the attendance chart, took her place, and began the lesson by asking the children to name the rules for the class. Virtually any approximation to the rules was consequated with a "slug" (metal disc) which served as a token. After all the rules were stated, the teacher proceeded with the lesson.

Lessons consisted of the teacher asking questions in rapid succession, calling on children who were in their space and had raised their hands (while aiming to equalize opportunities to answer), giving verbal feedback and tokens, and recording the accuracy of the answers. That is, praise and tokens were not given directly for attentive beahvior, but only for correct answers to questions. The teacher followed "It's About Time" (Edmark, 1973), an individual self-instructional program, which she adapted to the group setting. Lessons began with basics such as leaving the minute hand on 12 and setting the hour hand correctly, and culminated with time concepts such as a.m. and p.m. and questions like "What time did this class begin?" and "How many minutes have elasped since we had store?"

As a rule, the teacher ignored talking out and minor infractions of the out-of-space rules. Occasionally, when a child was being very disruptive, the teacher directed the child to correct his/her behavior, warned that another offense would result in "free chair", reiterated the rules, or instructed the boy to take his seat in the "free chair". (Consistent with the program at the Center, each child wore a wrist band which signified that he/she was eligible for reinforcement. When sitting out was necessary, the child also gave up his/her band [Herr, Reference Note 1]. The band system was similar to the "time out ribbon" procedure described by Foxx and Shapiro [1978].) The child earned the right to participate again by sitting quietly on the free chair for a period of time ranging from about 1 to 5 minutes. If the child did not cooperate with the free chair rules, he/she was removed from the class by one of the observers or another assistant. Usually the threat of removal sufficed. Once removed, the child was required to sit quietly in the hall outside the room, or, if still uncooperative, was taken to the "Fix-It Shop". (The "Fix-It Shop was staffed by specially trained technicians who used their judgment about appropriate disciplinary actions, depending upon their experience with the student, the offense, and the cooperativeness of the child on arrival. They employed such procedures as brief seclusion, positive practice, and relaxation.)

These procedures continued throughout the study. Vicarious prompting was used in addition to them. In sum, the goal during the baseline phase was to organize the lessons and disciplinary procedures as effectively as we could imagine, with the teacher being allowed to employ all of the tactics that experienced teachers might employ, except vicarious prompting.

Halfway through and at the end of each 50 minute class, there was a break for exchange of tokens. During "store time" the rules were relaxed considerably and the rules for coding behavior changed correspondingly. The children, for example, were permitted to talk among themselves and, of course, to handle their own tokens. Essentially, the only rule was that they stay in their seats until it was their turn to come to the store. After the middle-of-class store time, the teacher resumed class by once again asking children to state the rules for the class.

Design

The general plan was to intervene in the order of acceptability and instrusiveness of procedure, using first a multiple baseline across behaviors of one student, second a multiple baseline design across children, and third reversals. Accordingly, the first procedure tested after baseline was vicarious prompting with praise only for just one class of disruptive behavior (out-of-space behavior) of one student (Student A). This phase is labeled VPO in Table 1, which lists the phases and the number of sessions per phase.

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INSERT TABLE 1 ABOUT HERE.

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Vicarious prompting consisted of the teacher making statements like, "B, I sure like the way you're sitting up to the desk with your feet down", "That's good, C, you're not playing with your tokens", "C, you know to keep your bubble gum in your mouth", and "I like the way you are keeping your hands in your own space, B", when she noticed A was out-of-space. That is, the teacher described and praised appropriate behavior that was the opposite of the behavior the target child was engaged in at the time. In addition, the teacher did not call on the target child until he had ceased the inappropriate behavior, just as she had been doing during baseline.

During the third phase, both out-of-space and talking out were followed by vicarious prompting (VPOT). In the fourth phase, prompting was applied to Student B as well. The remaining phases were alterations of VPOT and baseline conditions.

At the end of the term, the children were again administerd the test of time-telling, used previously to select them. These tests were given individually by the observers.

Behavior Definitions and Reliability

The teacher recorded correct and incorrect responses to questions and tokens earned. Obtaining estimates of reliability of these measures did not appear necessary. The observers recorded vicarious prompts, length of time the child was on the "free chair", the time taken up by the store, talking out, out-of-space, and the residual category, attending.

Definitions were as follows: Vicarious prompt--the teacher praises a child's behavior when another child is engaged in the opposite, inappropriate behavior. The observer circled the code for vicarious prompt and noted which child had provoked it. The teacher also flashed a light whenever she prompted vicariously to insure that each instance was recorded. Time on free chair--begins when the teacher asks for a child's wrist band and ends when the child returns to his/her seat at the table. Time in store--begins when the teacher announces "store" and ends when the teacher takes her place at the table. Both times were recorded as the number of 10 second intervals included. Talking out--during class, any mouth-made noise when not called upon, e.g., whistling, laughing to side, comments, saying answers without being called on, and calling out the teacher's name; during store, talking is permitted except calling for the teacher's attention. Out-of-Space-- during class, when any part of the body is located outside of the child's working area, e.g., chair is more than arm's length from table, child touches anything that does not belong to him/her, child intrudes on another child's or teacher's working area, child puts foot on table, throws objects, hits, kicks, and manipulates tokens or other non-task items; during store, as above, except child may manipulate his/her tokens and other personal items. Attending--interval has elasped and neither talking out nor out-of-space has occurred.

One observer coded Student A's behavior every 10 sec. for the entire session with 5 to 10 second breaks after each 36 intervals, for a maximum of 216 intervals per session. The second observer coded the other children in unsystematic order for 36 10 sec. intervals or multiples thereof. Depending upon the number of children present, how promptly the class started, and the need to escort a child from class, the number of intervals per non-target child ranged from 36 to 144 10 sec. intervals per session.

Estimates of observer agreement were obtained on at least the coding of the target child's behavior in 34 of the 35 sessions reported on. (Observer agreement was assessed in 23 of 38 sessions of the replication class.) Mean and range per cent agreement per block of 36 intervals (smaller total divided by the larger total), were: Attending-- 95%, 78-100; Talking out-- 83%, 50-100; Out of Space-- 91%, 60-100; Vicarious prompting-- 97%, 70-100.

RESULTS

Attending Behavior: Figure 1 displays the percentage of intervals per session in which attending was coded for Students A, B, and C from the 21st session, the point at which sufficiently high levels of observer agreement were obtained. The solid vertical lines mark phase changes directed toward the student whose behavior is plotted in that portion of the figure; the dashed lines are to aid in assessing effects on the other children's behavior. Student A was selected as the first target subject because of his low rate of attending (mean = 55%) and its stability during baseline. With vicarious prompting of out-of-space behavior (VPO), his behavior improved slightly but with high day-to-day variability. During VPOT, attending increased significantly and leveled off at approximately 80%, which was quite acceptable behavior bearing in mind the strictness of the definitions the observers used. (Although the difference between VPO and VPOT seems to follow from the fact that only out-of-space behavior resulted in vicarious prompting in VPO and both talking

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INSERT FIGURE 1 ABOUT HERE.

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out and out-of-space were prompted in VPOT, separate plots of these data showed that these behaviors tended to covary. This finding led us to shift strategies to a multiple baseline design across students, and reversals, and to present attending behavior only.) The reversals which followed in Sessions 48-56 revealed clearly that vicarious prompting was effective with Student A. Attending averaged 20 percentage points higher when he was prompted vicariously.

The influence of vicarious prompting was also observed in the difference between A's behavior during class, when vicarious prompting was often used, and during store, when it was rarely used. During store times, talking out essentially did not occur, and out-of-space was ignored. Figure 1 includes data for store and class. In Figure 2, we have plotted mean percentage out-of-space per phase for store and class separately. Out-of-space during class varied systematically with the presence and absence of vicarious prompting while out-of-space during store remained fairly constant, excluding the final session.

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INSERT FIGURE 2 ABOUT HERE.

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Student B was selected as the second target partly because his rate of attending was highly variable and partly because of his reputation as a particularly oppositional boy. We anticipated that vicarious prompting would increase disruptive behavior. Our hypothesis proved to be incorrect. During VPOT (Sessions 45-53), B's attending stabilized at about 80%. Although attending declined during baseline (Sessions 54-55) and increased in Session 56 with VPOT, the small number of sessions involved in this reversal does not permit a firm conclusion about the influence of vicarious prompting on this student's behavior.

Student C was never the target of vicarious prompting. His rate of attending usually exceeded 70% and did not appear to vary reliably with the behavior of the other boys or with changes in vicarious prompting of their behavior.

Vicarious prompting was employed at the teacher's discretion. She prompted Student A on the average 7 times (0-11) per session during VPO, 6 times (1-17) during VPOT, and 5 times (1-8) during the second VPOT phase. Thus, it was by no means a demanding procedure to effect such large changes in A's behavior. The pro-rated mean with Student B was 17 times (10-24) per session during VPOT. In his case, the frequency did not decline over the phase. Vicarious prompting was never observed during baseline sessions.

Other Measures

Since opportunities to answer questions and earn tokens were contingent on being in space and raising hand quietly, these data varied directly with the behavior shown in Figure 1, but actually varied very little across phases, indicating that the teacher was alert to opportunities to call on each boy and equalize token earning. Percent correct answers varied little from the 90% level the teacher tried to maintain throughout the experiment by adjusting the difficulty of items. The total number of instances of in-class time out ("free chair") after VPO began was 6, too few to contribute to our analysis of vicarious prompting. From pre to post-test on time telling skills, scores increased an average of 26 points. Student A improved the least and had the lowest post-test score, 30%. Students B and C learned to tell time and earned almost perfect scores on material that had been covered in class.

DISCUSSION

Vicarious prompting with social consequences was clearly and significantly related to the behavior of Student A who was generally very attentive when prompts were used and significantly less attentive when inappropriate behavior was ignored. Moreover, higher rates of attending were maintained with less use of vicarious prompting, suggesting that the intervention could have been faded out completely in time. The results were less clear with the second student, whose behavior was highly variable but improving prior to intervention. While attending behavior did stabilize at roughly 80% during vicarious prompting rather than decline as we anticipated it might, the most that can be said is that the results were not inconsistent with the conclusion that vicarious prompting was functional for him as well. Since the rate of use of vicarious prompting did not decline, however, it appears that the major benefit was to shorten each episode of talking out and/or out-of-space by Student B.

Replication Study

In April, the second class of students was organized. The teacher, organization, rules, and procedure for this class ("Money Class") were the same as the Time Class. The educational objective, however, was to teach monetary equivalents, i.e., the names of coins and bills, their relative values, and the prices of common items. The children were selected on the same criteria: failing the pre-test on monetary equivalents, having the time slot available, and agreeing to enroll in the class. The group included four boys and two girls between 6-1 and 9-10 years of age with intellectual levels ranging from mildly retarded to low average and diagnoses similar to the Time Class. The obvious differences between the classes in subject characteristics were that the Money Group was younger, larger by two, and included two girls.

Their behavior during baseline was much more rowdy, however, with attending rates which averaged 39% and high day-to-day variability. We selected the four most uncooperative children for tracking and applied vicarious prompting with praise for the entire group for 14 sessions (VPsoc), vicarious prompting with tokens for 8 sessions (VPtok), re-instated baseline for 4 sessions, VPtok for 1 session, and then token loss for 6 sessions. On the three final days of VPtok, we also placed one boy (Student F) on an individual program of token loss for a subclass of talking out, i.e., telling other children the correct answer without being called upon (VPtok + TL). Token loss was accompanied by a statement of the reason for the loss.

The results for the group are summarized in Figure 3. Although mean attending increased to 60% with vicarious prompting

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INSERT FIGURE 3 ABOUT HERE.

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using praise, variability remained high and the attending levels obtained were still highly unsatisfactory. Vicarious prompting with tokens (VPtok), e.g., "Good, F, you earn a token because your hands are in your own space," when D was out-of-space, appeared to have no reliable effects. With reinstatement of baseline conditions, mean attending rates declined in three of four cases.

The general trend, while supportive of some effect of vicarious prompting, must be viewed with suspicion, because the use of time out (in class and exclusion from class) also increased through VPtok + TL and decreased during the second baseline. (The average rates of use per class per student were: baseline--.19; VPtok + TL--1.04; baseline--.72.)

Intervention with token loss for the giving away of answers by Student F was introduced not only to determine the effects upon his behavior but also to assess vicarious effects on the behavior of other members of the class. Since vicarious prompting was either not being effective at all or was insufficiently powerful, possibly because of its sublety or indirect nature, to effect the levels of attending necessary for group instruction a more direct intervention was necessary. Token loss was selected because it can be viewed as the direct equivalent of vicarious prompting. In token loss, the adult reacts to the target child by describing the misbehavior, taking away a token, and prompting alternative appropriate behavior, whereas in vicarious prompting, the adult describes appropriate behavior and gives another child the token as if to say to the target child, "This token could have been yours, you are losing tokens by misbehaving."

Our hunch that the children might be responsive to token loss was partially confirmed by Student F, whose calling out answers declined from about 3-5 per session to zero or one. The threat of token loss, itself, was quite effective.

Given this finding, we were more interested in using the days remaining to test the effectiveness of token loss than in substantiating the possibly slight effectiveness of vicarious prompting. Thus, the replication of VPtok was aborted after one session and token loss for every instance of talking out and out-of-space by any pupil was tried. The group mean of attending attained 68%, higher than previously but not high enough for a long enough period of time to be convincing. Of especial significance, however, were the facts that time out was used less often during these six days (.37 per student per day) and the number of tokens taken away were far fewer than the number of vicarious prompts. For instance, the mean rate of vicarious prompting of Student F was 22 (range 15 to 30) during VPtok + TL; the mean tokens taken away 3, (0-5). Thus the same rate of attending was associated with significantly fewer actions on the part of the teacher.

The results of this replication are equivocal with respect to the utility of vicarious prompting. Clearly, it did not have sufficient power to convert a highly disruptive and active group into model students. The results further suggest that token loss was at least equally effective with less intervention by the teacher.

General Discussion

Varying results of the range obtained in these two classes--large and reliable effects with Student A to highly suspect findings with members of the Money Class--probably are not unusual in the experience of behavior analysts and to be expected, since any procedure will vary in effectiveness depending upon the context in which it is tried. At the same time, equivocal results usually are not reported because they are of little interest unless the different results can be related to differences in parameters. In this instance, comparing the two groups of students yields insights about the parameters of vicarious prompting and has implications for the assessment of other procedures as well.

The Time Class was as cooperative during baseline as the Money Class was during their best phases, and none of the students whom we tracked in the latter group reached the level of attentive behavior attained by the Time Class. Thus, the teacher's approach to teaching time-telling, perhaps the subject matter itself, and her use of social and token reinforcers and time out were right for this group. Moreover, two of the four members (Student C and the student whom we did not observe after baseline) were usually cooperative and ignored the disruptive behavior of Students A and B. Our hypothesis is that under such circumstances--when a teacher has developed an effective reinforcing system and is dispensing reinforcers properly--vicarious prompting, and a variety of "simple" techniques such as reprimands (Doleys, Wells, Hobbs, Roberts, & Cartelli, 1976; O'Leary, Kaufman, Kass & Drabman, 1970), restatement of rules, and asking a student to attend will be effective with little reason to choose one technique over another. (Bear in mind that the results support vicarious prompting as superior only to ignoring inappropriate behavior.) The marked changes in A's behavior accompanied only occasional use of vicarious prompting. It was as if he needed only to be reminded for talking out or out-of-space behavior to cease for an appreciable period of time.

The performance of the Money Class, in contrast, showed that the classroom organization and reinforcement system were insufficient to achieve a consistent and reasonable semblance of orderly group behavior. The lack of reliable improvement from VPsoc to VPtok is one indication of the apparent weakness of the token reinforcers in the situation. If our reasoning is correct, we eliminated from analysis the very students who would have been sensitive to vicarious prompting, i.e., the two students whose attending behavior approached that of the Time Class. The remaining four children interacted frequently, called attention to each other's misbehavior, took tokens and materials from their neighbors, and so on. Under these circumstances, vicarious prompts may have been doomed to certain failure, because they occurred not only when the miscreant was being disruptive but also when there were distractions and reinforcement from classmates, i.e., when indirect teacher statements would be expected to have the least salience. Thus, a solution would not be found in subtle and indirect methods. Rather, the basic classroom organization would need revision.

Alternatively, when a teacher must compete with counterproductive peer reinforcement, direct punishment (e.g. exclusion and token loss) would be an effective solution. Thus, a warning followed by a few applications of token loss to Student F for calling out answers effected an immediate and virtually complete elimination of this behavior; and although data collection stopped too soon to confirm this impression, it did appear that the group as a whole was becoming more attentive during the token loss phase. Contrary to expectations, these gains near the end of the experiment did not affect student interest in attending class and were accomplished with less use of time out. At the moment, it is speculative to attribute the differences that were obtained between baseline phases and the vicarious prompting phase to vicarious prompting or time out, but we suspect it was time out.

When we designed this study, we recognized the risks for experimental purposes of allowing the teacher considerable lattitude in employing "garden variety" techniques in the classes and in setting her own rates of social and token reinforcement so long as they were equitably and consistently distributed over sessions. The first risk was that the children would become so well behaved that the study could not be completed, as almost occurred with the Time Class. A second risk that materialized was exemplified by the confounding changes in use of time out by the teacher. An increase from baseline to intervention would have been tolerable, provided time out had remained at the new level through reinstatement of baseline; it did not, thus rendering the results uninterpretable, the greatest risk of all as natural conditions as more closely approximated.

We regard the risks as necessary in the present state of development of applied behavior analysis in classrooms to enhance the generality and applicability of results. For example, we found no reliable evidence of vicarious reinforcement (i.e., spread of effects to non-target students) in the Time Class. This failure of replication could mean that vicarious reinforcement effects are obtainable only in highly controlled or highly deprived conditions, neither of which, we hope, applies as a rule in classrooms (cf. Broden et al., 1970; Kazdin, 1973, 1977; Kazdin et al., 1975). Similarly, other simple intervention procedures like reprimands and statement of rules have been tested early in studies, against baseline behavior much like that of our second class (cf. Becker et al., 1969). The results of prompts should be different when reinforcement contingencies have been effectively managed prior to their being tested and should be analyzed in such conditions.

Vicarious reinforcement effects found in other studies (Kazdin, 1973, 1977; Kazdin et al., 1975) have been discussed in terms of the cue properties for observing children of reinforcement delivered to target pupils. In studies of vicarious reinforcement, the delivery of reinforcement to target subjects was in no way contingent on the behavior of nontarget (observing) subjects. Therefore, interpretation of the effects relied upon the hypothesis that reinforcement of a target child served as a discriminative stimulus for appropriate behavior of the nontarget child. Accordingly, it would be said that, for Student A, reinforcement of one of his classmates was a discriminative stimulus for his performance of similar behavior. Another explanation is plausible, however; the teacher's reinforcement of another child is a negative social consequence--a mild social time out. Vicarious prompting (i.e., reinforcement of another's behavior contingent on the target child's misbehavior) makes it clear to the target child that the teacher's attention has been diverted from the miscreant because of his behavior.

Finally, we note that the three possible explanations for the effects of vicarious prompts--the discriminative properties of reinforcement, the information value of the prompt, and the aversive properties of vicarious prompts--are not necessarily competing explanations. Behavior principles do not preclude the concurrent operation of these factors.

Reference Note

Note 1. Herr, W.H. The color band system. Unpublished manuscript. DeJarnette Center for Human Development, 1977.

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Footnotes

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Table 1

Sequence of Phases

Phase	Student	A	B	C
		Number of Sessions		
Baseline (BL)		27	44	56
Vicarious Prompt for Out-of-Space (VPO)		9	-	-
Vicarious Prompt for Out-of-Space and Talk Out (VPOT)		11	9	-
BL		3	-	-
VPOT		3	-	-
BL		2	2	-
VPOT		1	1	-

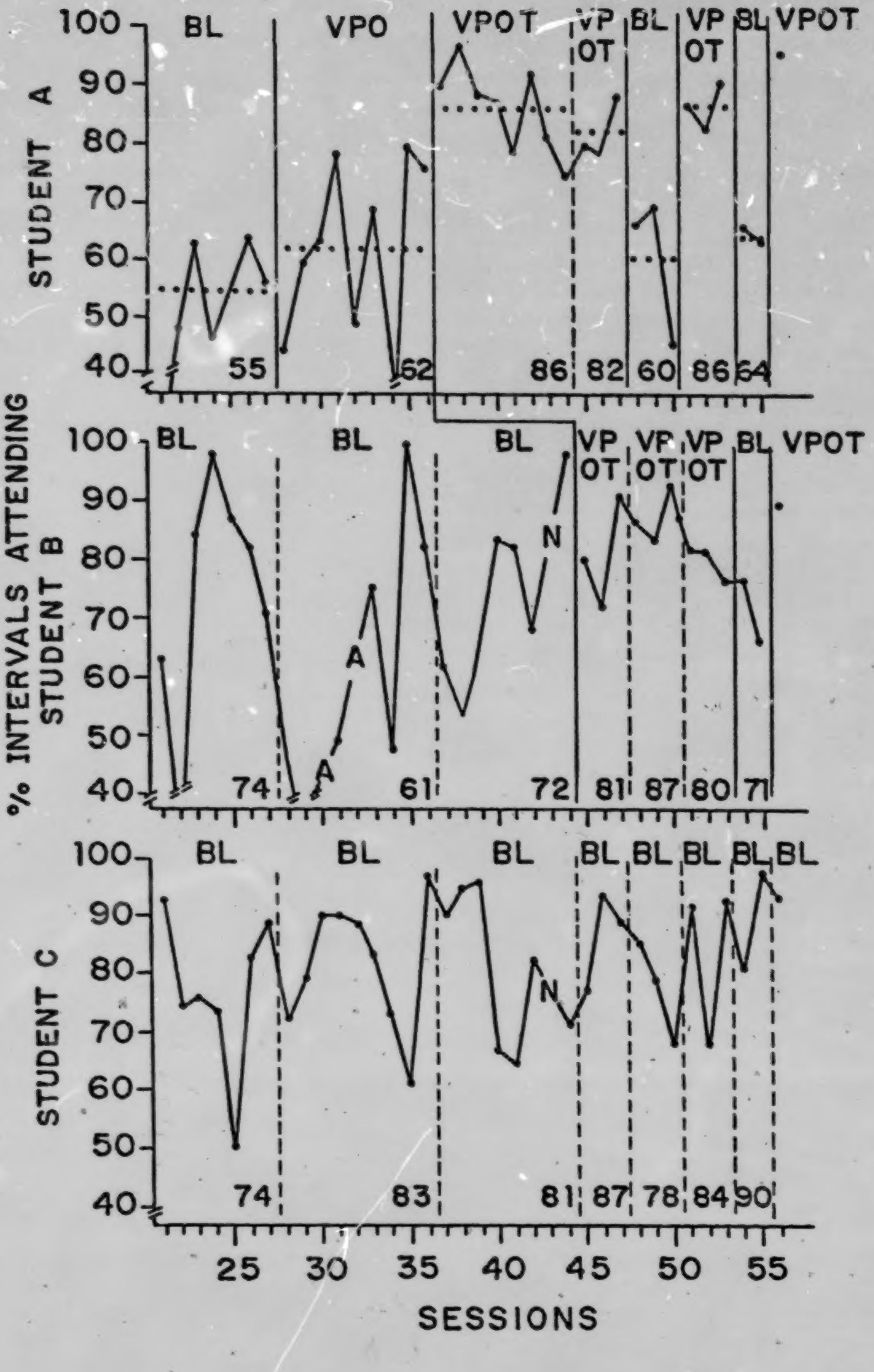
Figure Captions

Fig. 1. Percentage of intervals coded attending for Students A, B, and C of the Time Class. The solid vertical lines denote changes affecting the student, the vertical broken lines phase changes not directed at the student. The numbers in the lower right corner of each phase are the mean values. N = student present, but no data recorded. A = student absent. Data for the first 20 sessions are not plotted due to unreliability of measurement.

Fig. 2. Mean percentage of intervals in which Student A's behavior was coded "out-of-space" during teaching time (white) and during store (shaded).

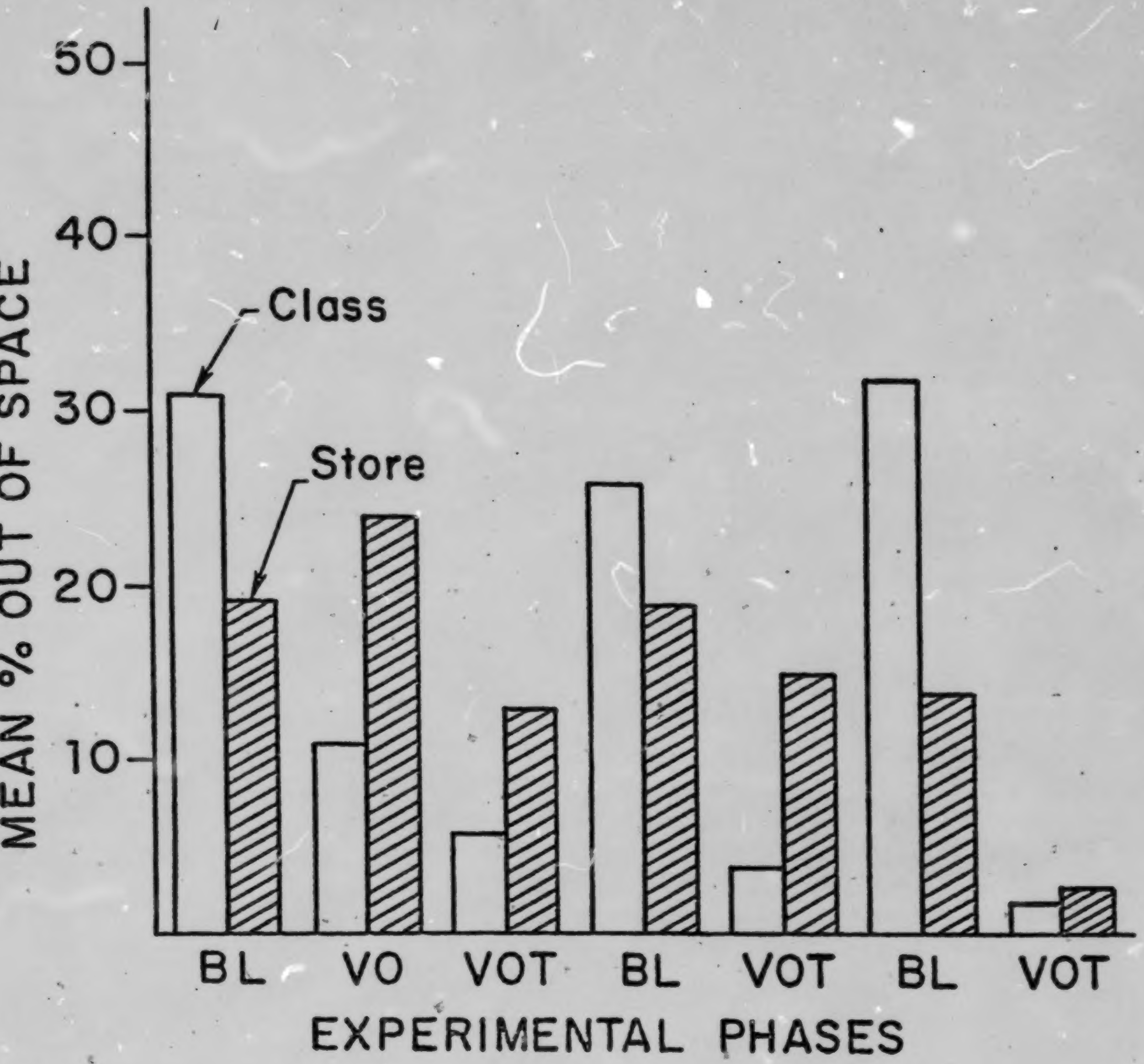
Fig. 3. Mean percentage of intervals in which students D, E, F, and G of the Money Class were scored attending. The numbers on the bar graphs are the group means for each phase. The arrow shows the point at which one session of VPtok + TL was held. The grand mean for that session was 54%.

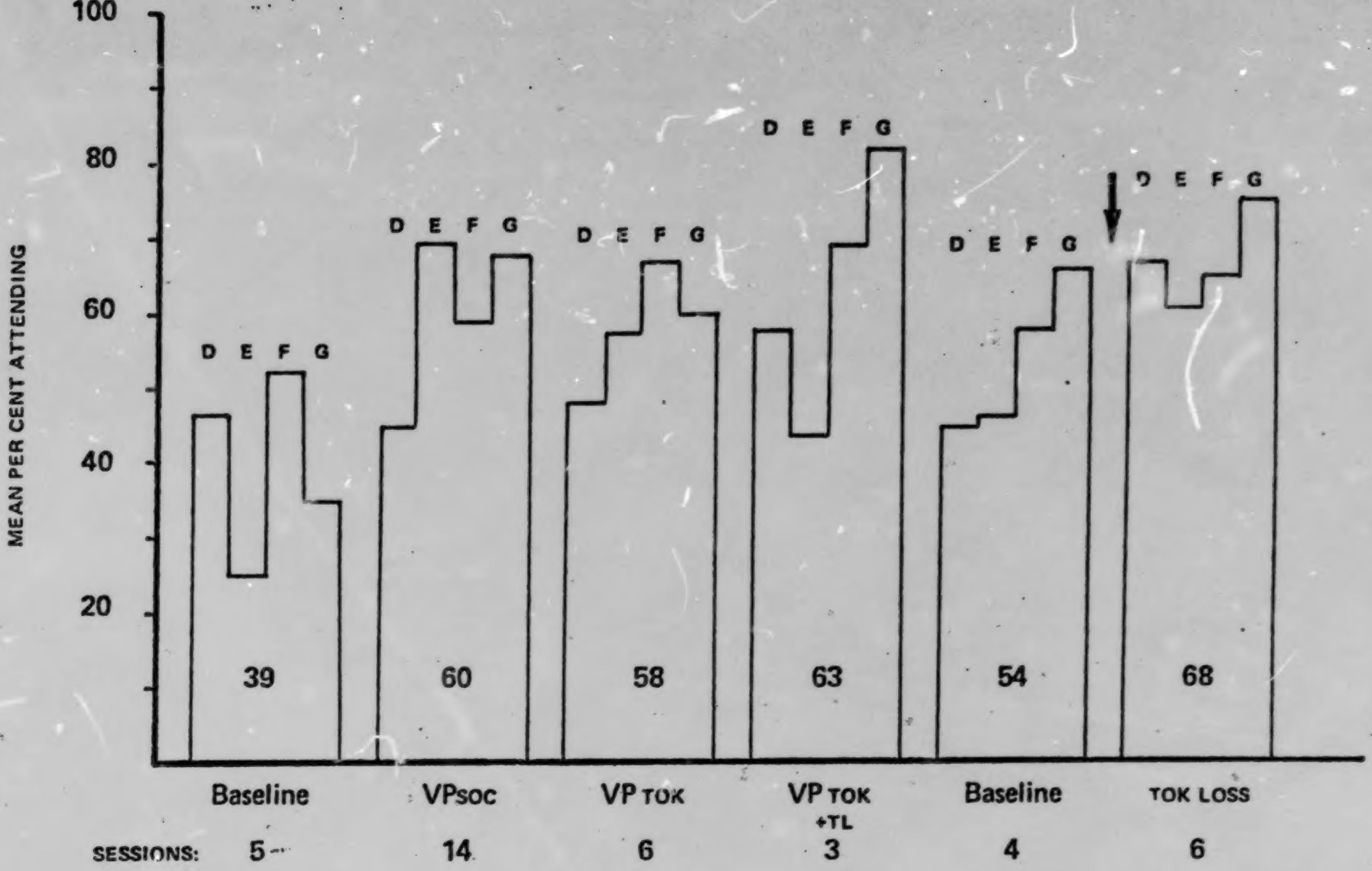
Figure 1



% INTERVALS ATTENDING
STUDENT A
STUDENT B
STUDENT C
BL
VPO
VPOT
VP OT
BL
VP OT
BL
VPOT
55
62
86
82
60
86
64
BL
BL
BL
VP OT
VP OT
VP OT
BL
VPOT
A
A
N
74
61
72
81
87
80
71
BL
BL
BL
BL
BL
BL
BL
BL
N
74
83
81
87
78
84
90
100
90
80
70
60
50
40
25
30
35
40
45
50
55
SESSIONS

Figure 2


MEAN % OUT OF SPACE
50
40
30
20
10
Class
Store
BL
VO
VOT
BL
VOT
BL
VOT
EXPERIMENTAL PHASES



Vicarious Prompting

I-31

Figure 3

APPENDIX J

Imitation as a Consequence:
Opening Remarks

Panel Presentation at the National Conference
of the American Association for Education of
the Severely/Profoundly Handicapped,
San Francisco, October 13, 1977

James M. Kauffman

University of Virginia

Ten years ago behavioral researchers were well along in the tasks of identifying the role of imitation learning in social development and finding effective techniques of teaching imitative responses to children. We now take for granted the importance of imitation skills in the development of children, and we have at hand research-based techniques for teaching handicapped children imitative repertiores. While there have been hundreds of studies of how children learn to imitate and of the conditions under which they will exhibit imitative responses, there have been very few investigations of the effects of being a model who is imitated. Yet after only a little reflection it is obvious that imitation is an event involving responses of two people, not just one, and that the model's behavior may be influenced as much or more than the imitator during an imitative interaction.

A decade or so ago researchers dealing with family relations began to see the necessity of examing the interactive, reciprocal effects of parents and children on each other; a one-sided, uni-directional model of parental influence on children was seen to be an oversimplification which is inadequate for analyzing what happens in families (Martin, 1975). Many researchers now are as interested in how children affect parents as they are in how parents influence children (Bell & Harper, 1977). I think we are soon going to see a shift in the focus of research on imitation analagous to the shift in thinking about family relations. That is, I think the side of imitative interactions that has been neglected--the effect on the model or the person whose response is matched--will be increasingly a topic for research. This research on the effects of being imitated should lead to increased understanding of how imitation can be induced and how imitation can be used as an effective reinforcing or punishing consequence.

Before turning to the ways in which imitation may be used deliberately as a consequence in programs of research or training, I ask that you consider the possible effects of imitation in some everyday circumstances. Most of us have observed one child teasing another effectively and mercilessly by imitating him. We have also seen a young child pay an older sibling or his parent a compliment by imitating him. Most people have felt gratification or uneasiness (or both) when they have been mimicked by a youngster or another adult. In fact, the aversive feature of being imitated is so commonly recognized that a popular magazine recently carried a cartoon in which a man is angrily complaining to a policeman, "I'm being followed by a mime." Consider the trainer who is trying to teach an imitative response to a child. The trainer will be reinforced by the child's imitation of the models he presents--usually, that is, because if the child is echolalic or begins imitating at inappropriate times, then his imitations are likely to be aversive for the trainer until they are brought under appropriate stimulus control. Being imitated may be a high compliment or the ultimate put-down. To be mimicked in dress and behavior--to be the model for the common person--is, perhaps, the surest sign that a public figure has arrived. To be impersonated by the leading mimes may be either exhilirating or devastating, I suppose. Clearly, we tend to view mimicry of a well known personality as complimentary or as taunting depending on the particular social circumstances of the person who is being imitated and special cues given by the impersonator.

There are circumstances under which observing someone else give the same response you have given, although it is not an imitative response in the usual sense, may be reinforcing or punishing (or at least be accompanied by positive or negative effect). Imagine the following: two people show up at a party where fashionable dress is important, both wearing exactly the same outfits; you are in a lengthy, pointless committee meeting, bored to death, and begin drumming your pencil on the table when you suddenly notice that another individual, who is apparently unaware of what you are doing, is drumming exactly as you are; you independently design a research study you think is particularly important and find that someone else, whose professional competence you greatly admire, has designed an identical study. In these examples, there are matching responses that are not imitative, since the first response did not set the occasion for the second. Still, there is likely to be affective arousal and, perhaps, other behavioral changes associated with such response matching. Perhaps in some areas of research, especially those involving reciprocal imitation, it is less important to note who is imitating whom than it is to observe that matching responses are occurring.

It should be clear by now that being imitated is not a particularly simple consequence to research. Whether imitation will be reinforcing, punishing, or a neutral consequence may depend on at least the following: who is being imitated by whom (that is, the relative social status and other characteristics of imitator and model); what is being imitated (that is, the topographical and functional aspects of the responses of imitator and model); how closely the imitator matches the model's response (that is, the degree of topographical similarity); the social context in which imitation occurs (for instance, whether the imitation occurs in a group or in a one-to-one setting); the frequency of imitation; and other cues or consequences such as praise or rebuke, paired with imitation. In working with very young or severely handicapped youngsters we may also need to consider their developmental level because the effects of imitation probably are dependent in large measure on the child's level of cognitive development and his reinforcement history.

Piaget (1962) suggests, in fact, that being imitated is a necessary first step in learning to imitate. That is, he says that children learn to imitate only after they are imitated by their parents. Unfortunately, Piaget offers no replicable experimental evidence that his hypothesis is correct. However, his theory has been used as a rationale for teaching programs in which imitating developmentally delayed children is included under the assumption that it will help to induce their imitation of adults. For example, Bricker and Bricker (1976) use Piaget's suggestion as the basis for imitation of severely retarded children during language training. Other writers have used the strategy Piaget's idea suggests--imitating the child as a means of getting him to imitate you--without direct reference to Piaget's work. For example, Des Lauriers and Carlson (1969), in descriptions of their work with autistic children, mention a case in which the therapist began by directly imitating a child's stereotypic wall-scratching (pp. 136-137). Van Riper (1972), in his introductory text in speech correction, makes the following comments about teaching the child to imitate:

> As in teaching the normal baby to talk, it is important that parents and therapists encourage all types of imitative behavior. We must identify with the child before he can identify with us. Accordingly, much of the early training of a child with delayed speech consists of sessions in which the parent or therapist shares the child's activities. If he scribbles, we scribble. If he explores the bottom of a drawer, we join him. If he hides under the table, under we go. If he grunts, we grunt too (pp. 107-108).

What is missing at this point is reliable experimental evidence that imitating children during the course of imitation training, does, in fact, accelerate the child's acquisition of imitative behaviors--accelerate acquisition more than other nonimitative consequences, such as food and praise or other novel, nonimitative social consequences.

It seems quite clear from our own research at the University of Virginia (Hallahan, Kauffman, Kneedler, Snell, & Richards, 1977; Kauffman, Kneedler, Gamache, Hallahan, & Ball, 1977) and that of others (e.g., Bates, 1975; Fouts, Waldner, & Watson, 1976; Parton & Priefert, 1975; Thelen, Dollinger, & Roberts, 1975; Thelen & Kirkland, 1976; Thelen, Kirkland, Dollinger, & Paul, 1977) that imitating normal or retarded children who have already acquired imitation skills makes them more likely to exhibit reciprocal imitative responses. However, we don't know yet what social circumstances or setting events will maximize reciprocal imitation.

Ancedotal evidence and a couple of our previous experimental case studies (Kauffman, Hallahan, & Ianna, 1977; Kauffman, LaFleur, Hallahan, & Chanes, 1975) point to the conclusion that being imitated can be a powerful aversive consequence. It seems possible, although the data so far are not extensive, that contingent imitation of inappropriate behavior is in some cases or under certain circumstances a highly effective aversive consequence--more effective or efficient than reprimands or other punishing social consequences.

Finally, I would like to note that being imitated is a naturally and frequently occurring social consequence, especially in early childhood. Like praise, reprimands, tokens, and other consequences, it has been used on an intuitive basis for many, many years. Unlike verbal praise and reprimands, imitating the child has received little research attention so far. The members of this panel are interested in pursuing such research questions as:

1. How can imitating the child during imitation training be used to best advantage, and is this stragety really more useful than others? Does it really offer advantages over the usual reinforcement techniques or novel nonimitative social consequences?
2. Under what conditions will imitating a child be most likely to induce reciprocal imitation?
3. How can contingent imitation be used as an effective punishment technique, and does it have clear advantages or disadvantages compared to other aversive consequences? Under what circumstances is it likely to be ineffective and under what conditions can it be used effectively?
4. What are the specific components of contingent imitation, as it is likely to be used by teachers, that make it effective? Is it actually the matching response that is reinforcing or punishing, or is it some other feature of the response-consequence relationship?

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APPENDIX K

CONTINGENT IMITATION AS A TEACHING AND MANAGEMENT STRATEGY FOR CHILDREN WITH SEVERE BEHAVIOR DISORDERS

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Paper presented at Conference on Severe
Behavior Disorders of Children and Youth,
Arizona State University, November, 1977.*

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My interest in the effects of being imitated began several years ago when I became involved with one of my students and a colleague in a review of literature on the uses of modeling with exceptional children (Cullinan, Kauffman, & LaFleur, 1975). I was impressed by the one-sidedness of the literature we reviewed and of the literature on modeling in general. That is, although we found very many studies showing how observers are influenced by watching models, we found no research whatsoever on how models are influenced by being imitated. Yet it occurred to me that imitation always involves at least two people, that modeling and imitating are very common, natural dyadic interactions, and that either the model or the imitator may be the target of a strategy of social influence. At about the same time that we were writing our literature review, apparently, other researchers independently noted the same one-sidedness we observed. Beginning in 1974 with a study published by Miller and Morris, there have been an increasing number of investigations of the effects of being imitated. However, the literature on this topic is not yet extensive, and most of the work has been with normal children. To my knowledge, our research group at the University of Virginia is the only group so far to publish any findings regarding the effects of imitating handicapped children.

Perhaps some comments on another (not entirely separate) area of research will help to clarify one of the reasons underlying my interest, and that of my colleagues and students, in the effects of being imitated. As Bell and Harper (1977) have pointed out in their recent book, there has historically been a bias toward considering parents' influence on their children to the exclusion of considering children's effects on their parents. Yet research of parent-child relations that considers only parental effects on children has not been very productive. Recent research in which a unidirectional model has been given up in favor of an interactional one--a model that includes child effects on adults--has been much more successful in explaining the outcome of child rearing practices. It is now recognized that child effects on adults is a historically neglected but very important research topic in its own right. I suspect that we will see, over the next several years, an analogous recognition of the fact that being imitated is an important but heretofore ignored topic for research related to behavior change processes.

The idea that being imitated may have a considerable influence on a model's behavior derives from at least three sources. First, everyday observation shows that being imitated is a common experience. Imitating someone else is not infrequently used intuitively by parents, teachers, and peers to influence behavioral targets. To be imitated may be either the ultimate compliment or the ultimate put-down. Second, there are anecdotal reports in the literature indicating the value of imitating children in certain teaching situations. For example, Van Riper (1972) describes the value of imitating young speech delayed children, and DesLauriers and Carlson (1969) indicate that they found it useful to imitate the stereotyped behavior of an autistic child during the early stages of training. Third, there is the theory advanced by Piaget (1962) that before a child learns to imitate he is imitated by his parents. Piaget's observations provide the basis for the suggestion in some language training programs that imitating the severely handicapped child may be important in the early stages of imitation training (e.g., Bricker & Bricker, 1976).

In many ways, being imitated is like other common social consequences (e.g., verbal praise or criticism) that have been used intuitively for many hundreds of years but have been carefully researched only during the past couple of decades. It seems timely now to research how this particular social consequence--matching the topography of a model's response--can be used to therapeutic advantage. Very probably, the answers to how contingent imitation can be usefully employed will be fairly complex, for it is apparent that being imitated is a social consequence that can vary considerably in its meaning and salience. What it will mean and how it will function will depend on at least the following considerations:

1. Who is being imitated by whom (i.e., the relative social status and characteristics of the model and the imitator)
2. What is being imitated (i.e., the topographical and functional aspects of the response)
3. How closely the imitator matches the model's response (i.e., the degree of topographical similarity)
4. The social context in which imitation occurs (e.g., whether it occurs in a group or one-to-one setting)

5. The frequency and salience of the imitation
6. Other cues or consequences accompanying the imitation (e.g., praise, criticism).

In our work at the University of Virginia we have posed three major questions for research:

1. How can imitation be used as a reinforcing or punishing consequence? As I have already indicated, it is reasonable to believe that contingent imitation, like other "natural" social consequences, can be harnessed for therapeutic benefit. We would like to know the circumstances, if any, under which contingent imitation is particularly useful and the circumstances under which it will fail. We would like to know how to maximize its effects when it is the consequence of choice.
2. How can imitation of the child be used to induce reciprocal imitation? In special education, we are constantly seeking effective means of inducing imitation of appropriate models. Reciprocal imitation appears to be involved frequently in the mutual exchange of reinforcement referred to as "social reciprocity." Perhaps imitating the child is the most efficient way to begin a reciprocal, imitative chain of social behavior.
3. Does imitating the child during imitation training facilitate the child's acquisition of an imitative repertoire? In the usual imitation training paradigm,

> the trainer presents a model, prompts the child if necessary, and reinforces imitative responses or approximations with social praise or food. Piaget's work suggests that imitation learning may be speeded up if, during imitation training, the trainer imitates the child. If we were to find that imitating the child really does speed up imitation learning more than other tactics one might use, then we would have found an important key to working with many severely disturbed and retarded children, because the importance of imitation learning for the progress of such children is well known.

I feel that a note of caution is in order here. Certainly, it is a truism that being imitated can be reinforcing or punishing, but exactly how being imitated comes to serve as a reinforcing or punishing consequence and its usefulness in therapeutic endeavors have not been well documented yet. That imitating children on an experimental task in a laboratory situation induces their reciprocal imitation has been pretty well demonstrated with both normal and severely retarded children, but the extent to which reciprocal imitation can be induced by imitating children under more natural circumstances isn't known. About all we have to support the idea of imitating children during imitation training are Piagetian observations and theory plus nonexperimental case reports; there are few experimental data (see Kauffman, Snell, & Hallahan, 1976; Welch, 1977). One must conclude at this point, therefore, that while imitating children shows some promise as an intervention strategy, a lot more data will be required to draw any firm conclusions.

With these considerations in mind I turn to brief reports of the data we have available today. I will be reporting studies relevant only to our first two research questions. The third question regarding imitating children during imitation training presents the most difficult methodological problems, and we have very little relevant information (see Kauffman, Snell, & Hallahan, 1976, and Welch, 1977, for available data). Some of the data I will be presenting has to do with retarded children. I believe these data are relevant to working with severely disturbed children because, as has often been pointed out, it is often difficult or impossible to make clear distinctions between disturbed and retarded children (Balthazar & Stevens, 1975; Hallahan & Kauffman, 1976, 1977, 1978; Kauffman, 1977), and the interventions found successful with one group are often equally effective with the other.

Contingent Imitation as an Aversive Consequence

Our first attempts to use contingent imitation as a decelerating consequence for undesirable behavior met with mixed success and failure. In our first experimental case study (Kauffman, LaFleur, Hallahan, & Chanes, 1975, Case 1) we were dealing with a 7 year old trainable mentally retarded girl who was a very sloppy eater. Demonstrating appropriate eating behavior and reinforcing neat eating did not resolve the problem. The major problem appeared to be one of excessive rate--when she slowed down, her neatness improved markedly. We tried contingent verbal reprimands, which reduced her rate and improved her neatness somewhat, but did not bring a satisfactory result. However, when an adult sat across the table and imitated her eating behavior (matching her spoonful-for-spoonful and spill-for-spill, with some exaggeration of the sloppiness), she improved dramatically. (Whereas she slopped her way through 3 or 4 cups of soup at lunch during baseline, most of it going on her clothing or the table or floor, she ingested about a cup at lunch during imitation phases of the study.)

Our second case study (Kauffman, et al., 1975, Case 2) was not so successful. When we had the teacher imitate a 9 year old trainable retarded girl's animal-like yelps during communication training sessions, her yelping increased dramatically. In this case, even though the girl held her hands over her ears and acted as if the teacher's imitative yelping were aversive, the teacher's imitation of her clearly served to increase yelping. It occurred to us that contingent imitation of inappropriate verbalization during communication training (which included calls for appropriate vocal imitation) was, in the first place, a procedure very likely to fail because of the child's likely confusion about what she should imitate.

In our third case study (Kauffman, Hallahan, & Ianna, 1977), we dealt with a 12 year old trainable retarded boy who had a habit of sticking his tongue far out of his mouth, especially when he was concentrating on something like seatwork. Reinforcing him for keeping his tongue in and giving him verbal reminders did not help much. However, having the teacher sit across the table and imitate his tongue protrusions drastically reduced the target behavior. When the teacher imitated, she grasped him by the cheeks to insure that he would not look away. Later, she was able to maintain the suppression of his tongue protrusions simply by tapping him on the chin if he stuck his tongue out, i.e., a faded cue was sufficient to maintain improvement. Unfortunately, we don't know whether or not grasping the boy by the cheeks without imitating him might have worked just as well as the procedure which included imitation.

J.S. Birnbrauer (with whom I am currently working as coinvestigator on a field-initiated grant supported by BEH) recently conducted a study at DeJarnette Center for Human Development in Staunton, Va., in which he worked with a group of severely disturbed children. The target child was a 5 year old girl who sucked her thumb in class. The other children in the class were five boys ranging from 5 to 10 years of age, also severely disturbed. The target child's thumbsucking and attention (to the teacher or other appropriate stimuli) were recorded, as well as the thumbsucking and attention of the other class members (one of whom was also a thumbsucker). Birnbrauer found that when the teacher looked at the target child and imitatively sucked her own thumb contingent on the girl's thumbsucking, the results were not encouraging: the thumbsucking of the target child did not decline, but the attention to task of all the children in the class declined and the thumbsucking of nontarget children increased. Clearly, the teacher was better off to ignore thumbsucking than to imitate it in this situation. Contingent imitation of inappropriate behavior in a group of highly aggressive, noncompliant children who are quick to pick up negative social cues may well be a highly inappropriate intervention.

Another study, still being conducted by Birnbrauer, involves a severely disturbed girl of 13. This institutionalized, moderately retarded girl exhibits several undesirable behaviors, including screaming, slapping the teacher, throwing things, and pulling her tongue with her fingers. Her behavior is being recorded during training sessions in which she is being trained to follow commands to perform motor responses or say words. There are many details of the training and research design I'll not report here, but I will give you the gist of the experimental procedures and results. The target response was the peculiar self-stimulation of tongue-pulling. One of our questions was whether any novel consequence might work just as well as contingent imitation. Therefore, the first intervention consisted of having the trainer perform a novel motor behavior (rubbing her shoulder) contingent on the girl's tongue pulling . Tongue pulling was not affected by this consequence. Our next question was whether contingent imitation would decelerate the target response; it did not make an appreciable change. It seems reasonable to believe that imitation may derive its effectiveness as an aversive consequence from its association with other aversive events. That is, it is probable that being imitated for undesirable behavior becomes a secondary or conditioned aversive stimulus. Therefore, in the next phase of the study the trainer applied a brief time out (10 sec. during which teaching materials, reinforcers, and attention were removed) after imitating tongue-pulling for one or two seconds. During this imitation plus time out phase, there was a marked decline in tongue pulling.

Subsequently, imitation alone maintained tongue pulling at a low rate, suggesting that, indeed, imitation became a conditioned aversive stimulus. In the next phase of the study a different trainer--one who had never administered time out to the subject--conducted the training sessions and, using contingent imitation alone, maintained the same low rate of tongue pulling as the first trainer. This seems to indicate generalization across trainers. The rest of the study to date is complicated by the reappearance of tongue pulling, the failure of imitation alone to decelerate it, and the appearance of new self-stimulation responses (nose flicking, head slapping, and ear flicking), only one of which (nose flicking) appears to be responsive to imitation. The data are not all in yet, but at this point it seems likely that contingent imitation does become conditioned to other aversive events and, like other mild social punishment (e.g., reprimands), is likely to lose its effectiveness over many trials in which it is not paired with other aversive events. Once it has become a conditioned aversive event it may be a particularly efficient strategy for certain responses (e.g., nose flicking) depending on their topography and frequency.

Imitating Children to Induce Reciprocal Imitation

There is now a substantial literature showing that imitating normal children tends to induce their reciprocal imitation of the imitating adult (e.g., Bates, 1975; Fouts, Waldner, & Watson, 1976; Kauffman, Kneedler, Gamache, Hallahan, & Ball, 1977; Kauffman, Gordon, & Baker, in press; Kneedler, 1975; McKee, 1977; Parton & Priefert, 1975; Thelen, Dollinger, & Roberts, 1975;

Thelen & Kirkland, 1976; Thelen, Kirkland, Dollinger, & Paul, 1977). We have found the same phenomenon--increased imitativeness in children who have been imitated--to occur in institutionalized mentally retarded children (Hallahan, Kauffman, Kneedler, Snell, & Richards, 1977). Birnbrauer and I are currently attempting to extend our research to include institutionalized emotionally disturbed children.

Our research strategy, which has been evolving over several months of experimenting and is still changing, can be described in simplified form as follows. A child and an adult are brought into the experimental room and given identical sets of toys to play with. In some play sessions the adult imitates what the child does with the toys; in other sessions the adult is counterimitative, doing the opposite or something quite different from what the child does; and in still other sessions the adult is simply nonreactive to the child's play. By recording which toys the child plays with and how he behaves during these play sessions, we hope to be able to find out what effect, if any, imitation (as opposed to counterimitation or nonreaction) may have. We are also interested in knowing whether or not being imitated during the play sessions makes the child more imitative of his adult playmate on another task. Therefore, we intersperse probes in the play sessions. These probes give the child a chance to imitate the adult's verbal, motor, and color choice behavior in feeding plastic "cookies" to a "cookie monster." (We have described the cookie monster apparatus in detail in previous publications.) For example, the adult might pick up a red cookie, sniff it, say "this cookie smells just right," and then slip it in the monster's mouth, or choose a yellow cookie, salute the monster while saying, "Yes sir, cookie monster, here's your cookie," and pop the cookie in the monster's mouth. After the adult feeds the monster each cookie, the child is given a turn. A probe consists of several trials in which the adult goes first and the child has a chance to imitate. By comparing the child's imitativeness on the probes following different play sessions, we can observe the effects of being imitated during play on reciprocal imitation.

We are still attempting to work out procedural and design problems, and we don't have many data yet. The data we have so far do not seem to lead clearly to the conclusion that for disturbed children being imitated is reinforcing and tends to induce reciprocal imitation. We simply don't know yet to what extent our data reflect limitations of our research strategy.

Summary and Conclusions

Being imitated is a naturally occurring social consequence that may have a powerful influence on one's behavior. However, it is an aspect of modeling and imitation that, until very recently, has been totally neglected. Research data available so far suggest that imitating children might be particularly useful in some cases as an accelerating or decelerating consequence for particular responses, as a technique for inducing reciprocal imitation, or as a way of accelerating the acquisition of imitation learning. Investigations with handicapped children are only in the beginning stages, and much work remains to be done before any firm conclusions can be drawn.

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APPENDIX L

PAPER PRESENTED AT A COLLOQUIUM OF THE PSYCHOLOGY DEPARTMENT
College of William and Mary
November, 1977

IMITATION AS A CONSEQUENCE

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Imitation as a consequence refers to minicing or copying another's behavior immediately after it occurs. Anecdotes and research indicate that imitating another's behavior may increase or decrease the behavior that is imitated. A third effect of imitation is facilitation of imitation in return. This effect has been called "reciprocal imitation." In fact, Piaget, and other students of child development, believe that imitation of the infant's behavior is important, if not essential, to learning to imitate. The baby smiles, and we smile back; the baby says, "duh." and we repeat enthusiastically, "daddy." After many such experiences young children copy the behavior of their caretakers. I shall focus on the use of imitation to decrease behavior.

The particular aim of our research is to determine the parameters - to understand the conditions in which imitation will function in the way we desire. Stated another way, the question is: What do we need to know about the client and situation in order to make a better prediction about the effects of imitation? As with all events that we might think about using as a reward or punishment, imitation can be either or neither. Take, for example, a study reported by Kauffman, LaFleur, Hallahan and Chanes (1975). They report two case studies. In both the aim was to decrease high rate objectionable behavior. In the first case, the objective was to slow down a retarded child's rate of spooning food into her mouth. Her rate was so high that spillage was a problem, and her behavior at the table was described as "socially repugnant." Her rate of spooning during baseline was approximately 180 spoonsful per lunch or about 1 per 7 seconds. During this period, the teacher modeled appropriate table behavior, instructed other students at the table, and ignored the subject's high rate of spooning. Then for 5 periods, the teacher reprimanded ("Eat more slowly," "Look at what you"re doing") the child every time she displayed inappropriate eating behavior. The rate, with reprimanding, declined to about 120 spoonsful per lunch period. In the next phase, ignoring was once again tried and the former high rate was once again quite evident. Now suppose the teacher were to eat just as sloppily as the child did? What would you predict? During two phases in which imitation was employed, the spooning rate was a good bit lower and presumably acceptably slow.

Why? What is there about seeing someone else eating sloppily? There are other questions that one could ask about this particular study naturally, but being imitated did serve as an aversive or punishing event.

In the second case that Kauffman, et al, report, the target behavior was a vocal response that the authors describe as "yelping." Data were collected during language and communication sessions where two other children were present. During baseline sessions "yelping" was ignored, while correct responses were reinforced with edibles. There were about 12 yelps per session. During two imitation phases that followed, yelping increased to about 18 yelps per session. Thus, imitation, in this instance, was a positive reinforcer. Any consultant would, of course, like to avoid giving advice that produces exactly the wrong results.

The research we have begun with imitation is part of a larger program in which the aim is to develop behavior change procedures that can and will be used, i.e., are practical and feasible in classes, in homes, etc., and also are sufficiently well understood to be able to decide *when* they should be used. The range of procedures to decelerate inappropriate behavior is presently fairly limited and the available techniques are practically difficult and/or ethically questionable. On the most benign end of the spectrum, ignoring a behavior is often effective in decreasing the behavior. Ignoring, however, is difficult for some to employ and the outcome consequently is inconsistency and an increase in the persistence of the behavior. Yelping and sloppy eating *could* have been ignored in that they were doing no harm to the child or others except what might have come from ridicule by peers and limiting opportunities because the behaviors were embarrassing to their parents. Also ignoring simply is ineffective in a number of circumstances. At the other extreme, we have techniques like exclusion from the group, overcorrection, and physical punishment. These procedures raise ethical concerns and are time-consuming and often impractical. Thus, there is a great need for techniques in between. Imitation might be one of these in between measures. First, it can be an effective punishing event, as was illustrated with the first of Kauffman, et al's studies. Secondly, it requires no special equipment and can be administered any time, anywhere. Thirdly, it appears to be an acceptable procedure to many teachers, parents and so on, provided they would not have to do it for very long periods of time. Fourthly, it does not interfere with the client's continuing in the situation such as exclusionary Time Out does, and it does not require physical contact and the possible abuse that might follow such as sometimes occurs with overcorrection. Fifthly, if it will at least temporarily stop inappropriate behavior, it will provide the opportunities needed to reinforce other appropriate behavior. In order to reinforce slower rates of eating, for example, somehow one needs to induce slower rates. That is why we have become interested in studying imitation as a consequence.

Let me present briefly the rationale underlying the preliminary data that we have collected. We have started with the view that imitation is probably like other social consequences such as "Good," "Stop that," with no unique characteristics except that it does simultaneously specify the behavior being consequated. Therefore, its effectiveness will vary with the consequent events with which it has been paired in the past or with the aversive events that the behavior has been paired with in the past. Yelping, for example, was consequated in the context of speech instruction. Ordinarily, in speech lessons, there is a fair amount of reciprocal imitation. Thus, in addition to the pleasure that hearing the teacher yelp might evoke, being imitated might well have meant that the behavior was good. Sloppy eating, in contrast, had been labeled bad and, thus, being imitated was a conditioned aversive stimulus. In other words, hypotheses about how conditioned reinforcers and conditioned aversive events are established seem to us to apply to imitation. Another parameter that seems of importance would be the rate of reinforcement for appropriate behavior and the type of reinforcement in the situation.

The first study was conducted during the first period of a first grade preparatory classroom at DeJarnette Center. The children in this class were referred to the Center because of short attention span, high rates of tantrums, hyperactivity, and oppositional behavior. This group was chosen because: (1) two of the children sucked their thumbs often; (2) attentive/on-task behavior of the group was quite high (about 90% of the intervals recorded); (3) teacher approval was high and reprimands very infrequent; and (4) thumb-sucking was generally ignored. The teacher would, however, not call on a child who was thumbsucking at the time, and she would say things like, "I sure like the way Johnny has his hands down so that I can see his face." The study was essentially of the "what will happen" type. We were interested in not only the target child's rate of thumbsucking but also the other child's rate and the group's on-task behavior.

The six children were seated in a semicircle facing the teacher. The lesson dealt with improving listening skills, teaching verbal concepts such as animal, furniture and the like. During five baseline sessions, the target child's thumbsucking rate was variable, averaging about 16% of the intervals observed. The other children's thumbsucking was virtually nil, and as already mentioned, the on-task behavior was on the average 90%. For the next four sessions, the teacher imitated the target child's thumbsucking, i.e., the teacher inserted her thumb in her mouth whenever and as long as the target child did. At the same time, she was quick to get the lesson going again and tried to keep her praise rate high. (This assignment was not the easiest thing to do). The outcome was: no change in the target child's rate of thumbsucking, an increase in the other children's thumbsucking and a 20% drop in on-task behavior. Although the target child said things like, "Don't do that," to the teacher and tried to hide her thumbsucking, her peers enjoyed the experience and did everything they could to induce the target child to make the teacher suck her thumb. In sessions subsequent to the imitation phase, baseline conditions were reinstated. Control of the group was rapidly restored and thumbsucking disappeared almost completely. This outcome is not interpretable, because of two significant confounding events. Firstly, there was a change in teachers, and secondly one of the children was transferred from the group. That a decline would occur after imitation ceased, however, is predictable from the Deci effect in which intrinsically motivated behavior declines after extrinsic reinforcement of that behavior. So, for the moment at least, don't try imitation the way we did when the peer group, if not the target subject, is likely to be reinforced by seeing the teacher imitate. The result is consistent with our analysis of imitation in that the reinforcers being used in this situation were principally social, there was no reduction in reinforcement rate during the intervention and there were no aversive consequences scheduled either for thumbsucking or the minor forms of disruptive behavior that the children exhibited.

The next study to be described briefly was conducted in a very different setting, with a very different youngster. The setting was 1:1 instruction-following and verbal training. The client was a 13 year old, moderately retarded girl who spoke very few words, was oppositional, and displayed a rich array of self-stimulatory behaviors. First we obtained a long baseline (24 thirty minute sessions) of tongue-pulling, her most common self-stimulatory response in two conditions of reinforcement for instruction-following behavior (FR 3 and FR 12). We provided extensive experience in imitation of an instructor who ignored tongue-pulling. Secondly, we assessed the effects of contingent imitation of tongue-pulling. Imitation had no effect. Thirdly, we paired imitation with a brief time-out in the following way: When the child pulled her tongue, the trainer copied the behavior for about 2 seconds and then lowered her head and remained silent for a minimum of 10 seconds and until tongue-pulling ceased. With this contingency tongue-pulling decreased from a mean of about 30% of the intervals observed to 7%. Fourthly, time-out was discontinued, but trainer imitation continued; tongue-pulling remained at less than 10%. Fifthly, imitation was applied to a second response, nose-touching. This response dropped dramatically from a mean value of about 50% during baseline to 0%. At this point it appeared that imitation had acquired aversive properties, but in the sixth phase we were not successful in suppressing tongue-pulling which meanwhile had gradually increased to a mean value of about 25%. We were also not successful in suppressing a third response, brushing her hand across the top of her head.

If imitation had become a conditioned aversive event by virtue of its being paired with time-out, then it is not surprising that its effectiveness diminished over time in the absence of back-up aversive events. At the same time, it would not be appropriate, of course, to attribute the temporary success with imitation, i.e., the suppression of nose-touching, to the history of pairing we provided. Presently we are attempting to replicate by once again pairing imitation of tongue-pulling with time-out.

In sum, imitation can serve to strengthen or weaken behavior. In the first study presented we asked what will happen in a group setting, not only to rate of thumb-sucking but also to the children's on-task behavior. The answer was that thumb-sucking was not affected and on-task behavior decreased considerably. In the second case presented, first imitation was neutral in a situation in which the child's behavior had never been punished in any way by the trainer. Then imitation became an aversive event after being paired with a brief time-out, but it once again returned to being neutral. Imitation is an interesting consequence to study because of its practical advantages. We suppose also that information about its parameters will be generalizable to other social consequences that one might think of using to correct or reinforce children's behavior in natural settings.

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Footnote

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APPENDIX M

MANAGING AND TEACHING THE SEVERELY DISTURBED AND RETARDED:

A GUIDE FOR TEACHERS

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PREFACE

In the years since Becker, Thomas, and Carnine prepared a pamphlet for teachers[1], the research literature on the topic of behavior management has grown tremendously. The suggestions Becker et al. made for teachers in the late 1960s have been largely supported, not refuted, by research findings during the intervening years. Thus, most of the suggestions we offer are not really new but, we hope, are refinements and elaborations of notions that today have a stronger foundation in research than they had a decade ago. The initial task we set for ourselves—to review all the relevant research—proved to be naively ambitious. Although our search of the literature was not exhaustive and there are numerous topics and issues not included in this monograph, we hope we have included enough of the crucial topics and a competent enough analysis of the literature to be of help to the teachers who work daily with especially-difficult-to-manage-and-teach individuals.

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[1] Becker, W.C., Thomas, D.R., & Carnine, D. Reducing behavior problems: An operant conditioning guide for teachers. Urbana, Ill.: ERIC Clearinghouse on Early Childhood Education, 1969.

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INTRODUCTION

Hardly a day goes by in which teachers of special classes don't have to ask themselves questions like "What am I going to do about Johnny? He's not doing any of his work," "Did I handle Suzy's tantrum correctly?" and "Would it have been better to have just ignored Jimmy's vulgarity?" Asking and answering such questions is part of the challenge of teaching. Frustration for teachers results not so much from the continuing need to solve student/teacher problems or even from knowledge of the fact that each problem has its idiosyncratic features. Rather, frustration is due to feeling that everything within the teacher's power has been tried and failed, or on the other hand, to feeling overwhelmed with possible solutions without clear guidelines for choosing among them. Every teacher has presented problems to colleagues and experts, only to be given diametrically opposite suggestions about how to solve them. Moreover, teachers know that consultants really cannot tell them the best method unless they first conduct an analysis of the behavior to determine its frequency, antecedents and consequents, the time and resources available to the teacher, and so on. Even then, few experts are willing to guarantee success if their advice is followed. Teachers know that ultimately the solution will require trial and error on their part.

In fact, one school of thought within the behavioral approaches to education and behavior management, i.e., precision teaching (Kunzelmann, 1970), explicitly acknowledges that teachers are in the best position to choose procedures wisely. Precision teaching advocates that teachers set up a precise and careful recording system for the behaviors of interest, count to obtain baseline rates, try the procedure that seems best to them, count the results over several sessions, and, if the rate of improvement is satisfactory, continue with the procedure. If not, then the teacher is advised to try something else, and try and try again until the problem is solved. For example, if the teacher has been counting the frequency of Jimmy's swearing in class and the rate over time has not been declining, then the teacher would try ignoring the swearing (while continuing to record it) and let the data answer the question, "Is ignoring an effective tactic?"

We have no quarrel whatsoever with the emphasis of precision teaching upon careful measurement of the rate of occurrence of appropriate and inappropriate behavior and being guided by the changes in behavioral rates that ensue. In addition to measurement, however, we think that some advice and guidelines about the likelihood of success with a procedure can be given, and that is our purpose in this monograph.

The bulk of this monograph consists of brief descriptions of commonly employed procedures or techniques, the research that has been done with the procedure and procedures like it, the characteristics of the student's behavior and setting to be considered before making a decision to try the procedure, and the pitfalls to avoid. The information should permit teachers to compare possible procedures and estimate the chances of success with each. We emphasize the probability of success for two reasons: First, in many instances the research simply has not been done. So, our recommendations will be based on theory or hunches. Second, any procedure we or teachers might think of trying may or may not work depending on the circumstances and the way in which the procedure is applied. Different results have been obtained (by teachers and investigators alike) when the procedures used were ostensibly the same. These contradictory results mean that the procedure does work provided certain prior conditions are met: the likelihood of success increases to the extent to which teachers can approximate those conditions. To take a familiar example, excluding Jimmy from a lesson for a few minutes every time he swears will not decrease swearing during lessons if the reinforcement rate for participating in the lesson is lower than that obtained while being excluded. Exclusion, under those circumstances, should increase swearing. On the other hand, if exclusion represents loss of reinforcement to Jimmy—actually is "time out" from positive reinforcement—swearing should decline, and the decline should be particularly rapid if appropriate speech is prompted and reinforced. The relationship between rate of reinforcement during "time in" and the effectiveness of "time out" has been demonstrated by Birnbrauer, Wolf, Kidder, and Tague (1965) and Solnick, Rincover, and Peterson (1977). Obviously then, to increase the chances of exclusion being effective, the teacher would first need to look at the rate of reinforcement during lessons, consider changing the reinforcers being used, check that the reinforcers are being dispensed contingently, and reduce, if not eliminate, positive reinforcement during the period of exclusion. If the rate of reinforcement during lessons is adequate and reinforcement during exclusion can be drastically curtailed, then exclusion is worth trying; but still the ultimate judge is whether or not the rate of swearing declines over sessions. (Incidentally, since most management problems are attributable to deficiencies in the system of positive reinforcement employed, consideration of the rate and type of reinforcers used and consistency of delivery is always advisable regardless of the nature of the problem or the procedures being contemplated to solve it.) Thus, while we cannot give the solution to Jimmy's swearing, we can reduce the range of choices. Teachers will have to ask themselves if their situation meets the prerequisites and if they can carry out the procedure consistently for the time needed to effect the desired results.

Before analyzing particular intervention procedures, we will discuss the definition of successful intervention, how to decide when changes in procedure should be made, general considerations, and basic principles of behavior.

Definition of Success

There are two meanings of the term "success", and success in the first sense does not predict success in the second. The first way we think of success is in terms of immediate effects of an intervention, i.e., the length of time taken to resolve the crisis situation and the amount of disruption to the class. The second way is in terms of rate of behavior, i.e., the number of times the behavior occurs over time in the future.

Since priority must be given to protecting students and teachers, often quick resolution of problems and avoidance of crises are essential considerations. The method of resolving problems in the present, however, may not reduce the likelihood of the problem recurring. Suppose, for example, that Suzy's tantrum was provoked by Ms. Smith's telling Suzy to put her things away before going out to play. The fastest way to end the tantrum would be for the teacher to revoke the requirement and clean the area herself, but that solution is quite likely to ensure tantrums in the future under similar circumstances. In this example, success in the first sense actually decreases chances of success in the second. Madsen, Becker, Thomas, Koser, and Plager (1968) provide a more subtle illustration. They recorded the number of times children left their seats (without permission, and presumably without good reason) and the number of times the teachers instructed them to return to their seats. Although the children usually complied with instructions to sit down, out-of-seat behavior occurred frequently with no apparent tendency to decline. The investigators then asked the teachers to tell the children to sit down more often, which the teachers did, and the children stood up more frequently! Finally, they advised the teachers to ignore standing up and to praise sitting and working. Under these circumstances, the rate of standing declined. The teachers' instructions to sit down were obeyed, and thus the problem was solved quickly every time it occurred. But apparently these instructions were also maintaining the high rate of standing, thus in no way solving the problem in the second--and more important--sense of success in education.

Both the short term and long term effects of an intervention, of course, must be considered. The teacher wants to select a procedure that minimizes disruption, danger, and use of time and maximizes the chances that desired behavior will increase and undesirable behavior will decrease. Unfortunately, we usually cannot have both. Instead, trade-offs need to be made between time spent on a particular problem now and time gained for other instruction in the future. (The exchange is analogous to that between doing a job correctly the first time, which may take longer and cost more, and having to do the job over and over again, which ultimately costs even more.) As a matter of fact, the more effective decelerative procedures are time-consuming and sometimes produce temporary increases in problem behavior, as teachers have no doubt experienced at times when they have changed class routines. We will point out likely immediate effects of each procedure, but successful intervention to us means that the procedure in time achieves the desired change in rate of behavior.

When to Change Procedures

Accepting that rates of appropriate and inappropriate behavior are the criteria of success raises questions about how long to observe a behavior and continue a procedure before deciding that something else should be tried--before deciding that something does, indeed, need to be done to increase Johnny's rate of completing assignments, for example. All of the procedures we discuss are ones which should be applied repeatedly and consistently before their effects will be observed and teachers can be sure that their intervention plan is succeeding. What does "repeatedly" mean--five times or for five days, 20 times or for a month, or even 100 times or for a semester? The question is not easily answered, although "repeatedly" certainly does not mean 100 times or for a semester. That would be far too many times and too long to persist with a program in the absence of data showing that substantial improvements were taking place.

The decision depends upon: (a) the importance of the problem or the priority that has been assigned to it; (b) the variability in frequency of occurrence of the behavior during baseline or the present intervention; (c) the number of times the procedure has been applied correctly; (d) what is known about the rapidity of the procedure; (e) other changes in the child's behavior, such as hesitation before acting, shorter duration of the inappropriate behavior, and less intense reactions; and (f) the trend in the rate of occurrence.

The decisions to change intervention plans should be based on the number of applications of the procedure rather than time, with the count starting from the instance in which the teacher began to apply the procedure consistently and correctly. The second point to bear in mind is to chart the behavior daily or after every session and look at the trend in the counts of behavior per day, session, lunch period, or whatever unit of time is selected (cf. Kunzelmann, 1970). For example, if Johnny correctly completes between 3 and 8 arithmetic problems per assignment during baseline and 12, 5, and 8 on the first, second, and third days respectively of intervention, we do not know if the program is working, but the numbers are high enough to suggest continuing a while longer.

If the next three totals are 10, 12, and 15 we certainly would continue until a plateau is reached, at which point we would have to decide if that rate of studying arithmetic is high enough. If so, the procedure could be faded out while watching that the rate does not decline. If not, another procedure, or perhaps a minor adjustment of the procedure in use would be tried. In a situation in which the aim is to decelerate a behavior—let us say Suzy's tantrums—the baseline rate is between 3 and 8 per day, and the first three days of intervention yield counts of 12, 8, and 5, once again we do not know if we have made a wise choice of procedure, but the downward trend of scores is encouraging. So probably the intervention would be continued. (Continuation would be especially indicated if the unusually high score on the first day of intervention was predictable from experience with the procedure. Paradoxically, an initial increase in undesirable behavior can be a good sign.) If the rate was still within the baseline range with no further downward trend three days later, e.g., 6, 4, and 5 times per day, a change in procedure is in order. But, to emphasize the amount of judgment involved, if the order had been 6, 5, and 4, continuation would be a reasonable decision to make.

To some readers, deciding to abandon a procedure after 6 days as we suggested in the second example will seem terribly fast, but it is not, considering that the procedure was applied 40 times and was applied consistently and carefully. To other readers, persisting that long will seem inappropriate, and they may be correct. There is no formula for taking all of the relevant factors into account, but we caution against changing procedures too rapidly. (It is not uncommon to observe procedures being changed after one recurrence of a problem behavior. We have also been told by teachers that reinforcement "didn't work", only to learn from further questioning that they had tried a particular system for only one day or had tried it for a week in which the student never earned any reinforcers. In the latter instance, the procedure had been abandoned after zero applications!)

Varying procedures in rapid succession when the aim is deceleration presents the real possibility that some procedures chosen will reinforce the behavior. Aperiodic (i.e., variable ratio or variable interval) reinforcement is well known to increase resistance of behavior to change. It would also seem to reinforce the children's belief that adults don't live up to their promises or threats. While it may be the case that a program of unpredictable aversive consequences would be most effective, the consequences and the schedule of presentation would need to be carefully selected, and to date no one has conducted the necessary research. Our opinions, therefore, are based on repeated applications of the same procedure. On the other hand, with acceleration as the goal, there is every reason to offer a wide range of choices of positive reinforcers to the students, to vary what is available from day to day, and to throw in some surprises as well.

In deciding when to change, the foregoing considerations, the relevant literature, and personal experience are the only guides we know of. Birnbrauer (1978) has suggested that teachers assess themselves. If they fall into the group that changes procedures rapidly, they should set a higher number of administrations than they usually feel are enough. If they judge themselves very patient, they should set a lower number of trials.

General Considerations

In order to write concise summaries of intervention techniques, we have had to make a number of assumptions about the groundwork that the teacher will have done, but the problem nonetheless remains. In this section, we summarize these assumptions. In sum, they are that the teacher: (a) knows the students well, (b) has thought about situational factors that might explain why learning is not progressing or why problem behavior is continuing, (c) knows the rate of progress or problem occurrence, and (d) is satisfied that the problem is of sufficiently high priority to warrant a special intervention program at this time.

1. We cannot overestimate the importance of establishing a system of counting behavior, recording it graphically, and being guided in decision making by trends in the data. Sometimes the graph will reveal that the problem is not as serious as subjective impressions suggest or that the rate of occurrence is declining with the procedures presently in effect. Thus, there may be no need to change tactics right away. Teachers deprive themselves of reinforcement when they do not count behavior carefully to assess their effectiveness. Often the objective data will show improvement that is not at all obvious in a subjective appraisal (Birnbrauer, Burchard, & Burchard, 1970; Marholin & Bijou, 1978).

2. Setting up a recording system to track certain behaviors and not others forces the teacher to carefully define objectives and often occasions reconsideration of goals. The teacher may discover that the goals are unrealistic for the student and should be broken down into components. The resulting change in approach to conducting lessons may, in itself, reduce the frequency of undesired behavior. For example, Jimmy's swearing and Johnny's not finishing assignments might be results of a high rate of failure. Alternatively, the goals may have been set too low, i.e., the work is too easy--Johnny and Jimmy are simply "bored". Still another possibility is that analysis of goals and the priorities assigned them may lead to the conclusion that other behaviors are more important and should be focused upon first. The teacher might decide that Jimmy's swearing should be ignored, for a while at least, on the grounds that

doing anything else might increase the frequency of swearing, and that swearing is an improvement over his previous behavior. The second general point is that teachers should reconsider their expectations of the students and their goals. If the expectations and goals are reasonable and are apparently not the source of the problem behavior, and the problem behavior has high priority, then a special intervention program would be in order.

3. Related to the foregoing, teachers should consider the rules that they have imposed, how clearly they have been presented to the students, and how consistently they have been enforced. Posting the rules, perhaps pictorially, teaching the children to verbalize the rules before lessons begin, and treating the children as collaborators in making up the rules are advisable practices. Whatever else is done, the rules for classroom deportment should be as few as neccessary for learning and safety and be communicated to the students by a variety of means, not the least of which is consistent enforcement.

4. Also related to the second point is the analysis of the educational materials in use. The teacher should ask if the materials are commensurate with the student's level of comprehension and if the student does in fact have the neccessary prerequisites to succeed in the task. Teachers no doubt appreciate the need to increase the complexity and quantity of demands upon students at a pace which each student's performance indicates is fast enough to foster the learning of new skills but not so fast as to result in a significantly lower rate of success. Sometimes, however, what appear to be minor changes will be major ones for the student, and it's worth having a second look at this possibility.

5. Special class teachers are advised to maintain a fixed schedule of daily activities over a period of weeks (Frederiksen & Frederiksen, 1977), and to mark off one activity from another by other means such as location in room and arrangement of furniture as well. These devices will increase the students' chances of learning the rules of deportment and other expectations that go along with each activity. For example, during reading lessons or in the reading area, quiet is required, whereas during art projects, reasonable levels of conversation and moving around to get one's supplies are permissible. Severely handicapped students will learn these discriminations faster if teachers take every step they can think of to make clear the time and place to behave according to one set of rules and the time and place where another set applies. At the same time, we should point out that a change in schedule of activities should be considered as a possible means of solving the problem.

The foregoing list is not exhaustive and probably contains nothing new, but we hope it suffices to remind teachers that they should not overlook obvious and possibly simple solutions before undertaking a special intervention program. In our procedural descriptions, we list only the special considerations each technique requires and assume that the teacher is satisfied with the general atmosphere, routine, educational materials, and goals that have been adopted. In other words, we assume that the teacher has organized a good educational environment and is trying to apply the following principles of behavior, but that for some reason the problems with Johnny, Suzy, and Jimmy have not responded as expected.

Summary of Basic Principles of Behavior

Reinforcement refers to the process of strengthening (increasing the rate of) behavior by manipulating its consequences. Behavior always occurs in a context. It has antecedents in the internal and external environments of the person, some of which are related to the occurrence of the behavior and some of which are not. Some changes in the internal and external environment also accompany and follow behavior. Some of these changes are positive reinforcers, and if they follow a behavior with regularity the behavior will increase in rate regardless of the teacher's intention (and sometimes regardless of whether or not the students are aware of the relationship between their behavior and the reinforcing consequence).

Some of the events that follow behavior will be aversive events or negative reinforcers—events which the person will avoid if they know how and have the opportunity. Again, it does not matter if the relationship between behavior and aversive consequence is planned or inadvertent. It is the contingency that matters and the frequency with which it is experienced. Behavior which is followed by aversive consequences will decrease in frequency. That process is called punishment.

Reinforcement (i.e., increasing the likelihood of behavior) and punishment (i.e., decreasing its frequency) through manipulation of response consequences can also be accomplished in two other ways. If the teacher arranges conditions so that desired behavior removes aversive consequences, the behavior will increase in frequency. For example, if Johnny were given 10¢ at the beginning of an assignment and told that he will lose one cent for each minute beyond 10 minutes of working on his assignment (and 10¢ is a positive reinforcer for Johnny), he is quite likely to finish his assignment within the 10 minutes allotted to avoid losing any of his cents. (This illustration also assumes that 10 minutes is ample time to complete the assignment and that Johnny is given some way of telling the time.) Such schedules are fairly common, although unplanned. All of us no doubt have dawdled or found little things to do to delay the start of some unpleasant task, and many children are inadvertently taught that if they can manage to delay long enough, mother or teacher will do the task for them. Dawdling is strengthened by avoiding aversive consequences. It's a fairly easy trap for impatient adults to fall into.

The second form of punishment, removal of positive consequences if undesired behavior occurs, is exemplified by such practices as requiring Jimmy to stay in from recess for 1 minute for each time he swears or excluding Jimmy from the lesson for 1 minute for each time he swears. If, of course, the consequences of cooperating during lessons are positive reinforcers or recess is a positive reinforcer, swearing will decrease. Another common use of this procedure is to withhold attention from or ignore a child until inappropriate behavior is replaced by more appropriate behavior. If the teacher's attention is reinforcing, then the act of ignoring will constitute loss of positive reinforcement and the behavior will decline in frequency. This procedure is known also as extinction. (Although there are technical distinctions that can be made between extinction and withholding or withdrawing positive reinforcers, these terms may be used interchangeably for most practical purposes and, therefore, the distinction need not be of great concern.)

The definitions of reinforcement and punishment are well known to teachers, and teachers trained in recent years in special education typically endeavour to positively reinforce appropriate behavior frequently and to prefer punishment (when it is necessary) in the form of withholding positive reinforcers to punishment in the form of presenting aversive consequences. Difficulties arise in application, however, from several sources:

(1) Children differ one from another in what is reinforcing and aversive to them, and thus teachers need to discover each pupil's "hierarchies" of reinforcement and punishment.

(2) The effectiveness of reinforcers and aversive events varies with such factors as the number of times they have been delivered in the recent past--we satiate on even the best of things and we adapt to even the worst with repeated presentations. Thus, the teacher should have a variety of reinforcers available at any time and change the array periodically.

(3) To be maximally effective, especially with severely handicapped children, reinforcers and aversive events should be delivered immediately so that the relationship between behavior and consequence is as clear as possible. If delivered late, the child is apt to be doing something else at the time, and, whereas the frequency of that behavior may be

strengthened or weakened thereby, that behavior was not the one the teacher had in mind. Fortunately, most children are reinforced by animated smiles, praise statements, hugs, pats, and symbolic or token reinforcers, and these can be given immediately and inexpensively at high rates. If these are backed up occasionally with other events, objects, and opportunities to engage in preferred activities, then social, tactile, and symbolic reinforcers usually will be quite effective.

(4) Reinforcement and punishment require repeated experience of the behavior-consequence contingency to be effective. Thus, for any plan to work quickly, consistency in reinforcing selected behavior (and withholding reinforcement from other behavior or punishing it) is essential. The other pupils in the class, together with constraints upon the teacher, will make consistency difficult to manage. For example, a teacher might not be able to require Jimmy to stay in from recess on some days because there is no one to stay with him. Whereas the teacher may have little trouble ignoring Susy's tantrums, an aide or other children may be less successful in doing so. Then again, Suzy's tantrum on one day may be particularly intense or longlasting and the teacher may feel compelled to step in. Lapses in consistency may mean that the behavior is on a partial or intermittent schedule of positive reinforcement, and such schedules do increase the resistance of behavior to change. Absolute consistency obviously is not necessary; otherwise no one would ever learn anything. The need to approximate absolute consistency as closely as one can makes it imperative that teachers satisfy themselves that they can carry out an intervention plan.

In addition to increasing and decreasing behavioral rates, reinforcement, extinction, and punishment also are the basis for learning discriminations, i.e., learning the times and places in which behavior is appropriate or acceptable and when it is not. The bulk of education consists of teaching discriminations—what numerous signs and symbols "mean". We say that a student can discriminate "b" and "d" if the student makes a "bee" sound to "b" and a "dee" sound to "d". Suzy may learn not to tantrum when the teacher is present but continue to do so when the teacher is absent and the aide is present. In the former situation, tantrums are not reinforced; in the latter they are.

Discriminations are taught best by arranging conditions so that the differences between occasions for a response and for not making that response are maximized. The teacher may also include prompts in the context to guide the child's responses at first. Prompts may be like hints or clues or they may be as direct as giving the answer to the student or literally guiding the child's hand to the correct object. The aim is to arrange conditions so that the pupil will emit the correct response or an approximation of it so that reinforcement can begin to strengthen it. Once an approximation is emitted, the teacher may shape the final behavior by gradually requiring more of the response before reinforcing.

Modeling or imitation is a familiar method of prompting appropriate behavior. Teachers say, "Watch me do it", "Repeat after me", "Watch Jimmy:, and the like. For children who have learned to watch and listen when asked to do so, modeling is a very efficient method of teaching.

Emitting a response after it has been prompted, while an excellent starting point is, however, rarely sufficient. The goal is for the behavior to occur without the model. Prompts, therefore, need to be faded out or made less noticeable. By way of illustration, suppose a teacher had superimposed "b" on a picture of a bee or had the children buzz like a bee when "b" was presented and used Dorothy, the doll, in the background for "d". To transfer the control of "bee" and "dee" to just the letters "b" and "d", the pictures would be made more faint or presented only partially, i.e., faded out, on subsequent trials. A simpler method than fading is to delay presentation of the prompt (the buzzing sound or picture).

In trying to discover the reasons for misbehavior or a problem in learning, teachers should not assume that behavior taught in one context will generalize. Instead, they should expect that the children will discriminate and be capable of emitting the appropriate behavior only when the prompts are present. Whenever a teacher says something like "Jimmy should know better, he's been doing it correctly", the chances are good that the stimuli have been changed and that the element that was controlling his behavior has been omitted. While the teacher thought Jimmy was learning one thing, he actually was learning something else. We suggest that a teacher should use prompts to the hilt, but also fade or delay them and test to be sure that the behavior is being controlled by the appropriate elements of the stimulus situation. Stokes and Baer (1977), recognizing that generalization should not be expected, but rather programmed, provide an excellent summary of methods of programming generalization.

No matter how "crazy" a student's behavior may be, teachers must assume that the behavior is related to the contengencies of reinforcement and antecedent-response contingencies occuring in their classrooms and that the behavior will be amenable to change by rearranging these contingencies. Teachers who apply the principles of reinforcement with sensitivity regarding the differences among children, with awareness of their own actions, with carefully selected goals in mind, and with recording systems to assess their progress, will, we believe, have less occasion to refer to the more specialized intervention procedures that are described in the following sections. We urge once again that teachers, prior to technique-hunting to solve the problem of the day, review their goals, the organization of their classrooms and activities, and the extent to which they are managing contingencies well.

POSITIVE REINFORCEMENT

One of the key elements in successful teaching and management of children, handicapped or not, is positive reinforcement—providing rewarding consequences (positive reinforcers) for desired behaviors. Every teacher and parent must use this technique to be successful, so the question confronting teachers and parents is not whether but how to positively reinforce the children in their charge. Other techniques (e.g., punishment in its various forms) may or may not be necessary, but positive reinforcement is truly indispensible.

As we mentioned previously, a positive reinforcer is an event which, when it is presented as a consequence of a particular behavior, increases the chances of that behavior occurring again. Reinforcers fall into two general categories—unconditioned and conditioned reinforcers. Unconditioned reinforcers are "naturally" reinforcing items or events such as food, water, and play. Conditioned reinforcers are such things as money, tokens, and praise which derive their reinforcing value from previous association with unconditioned reinforcers. Uses of positive reinforcement can be as simple as saying "good" or "right" after a certain behavior has been displayed or as complex as a detailed token system or contract. We will explore each of these methods, the selection of reinforcers, and how to use them.

Social Reinforcement

Social reinforcers consist of such things as words of praise, nods of approval, hugs, pats, smiles, and other indications that the child has done something to please another person. These are perhaps the most easily administered forms of reinforcement and are most frequently found in a child's natural environment and in the successful teacher's repertiore of responses.

The most common form of social reinforcement used in a classroom is simple verbal praise (Madsen, Becker, & Thomas, 1968; Wasik, Senn, Welch, & Cooper, 1969). The praise typically involves saying to the child during or immediately after the performance of a desired behavior "Good, I like the way you . . ." In this way, the teacher expresses approval and specifies the behavior which has earned it.

Klotz and Shantz (1973) performed a study with 12 adolescent boys in which verbal approval was given for cooperative play. Significant increases were found among the boys who received the approval, while no increases were found among boys who served as controls and received no praise. All of the subjects were classified as emotionally disturbed and had rarely shown cooperative tendencies before the intervention.

Several studies have also been done on the effects of nonverbal forms of social reinforcement. Kazdin and Klock (1973) studied the effect of smiles and physical contact on attentive behaviors of moderately retarded children. Physical contact, in the form of pats on the back, increased the attentive behavior of 11 out of 12 students, and smiles increased attention in 10 out of 12 children. In another study with 10 emotionally disturbed boys of average intelligence, physical contact in the form of hand presses on the shoulder was compared with verbal approval alone (Clements & Tracy, 1977). Results indicated that a combination of the two was most effective, while touch alone was somewhat better than verbal approval alone. All forms of approval produced greater results than no praise at all.

Another interesting factor related to social reinforcement is the effect that different words and signs of approval have on different types of children. In a study comparing affective praise ("good" and "fine") with informative approval ("right" and "correct") using both mentally retarded and nonmentally retarded children as subjects, Clinton and Boyce (1975) found that retarded children performed at higher levels following affective reinforcement while nonretarded children performed better under informative reinforcement conditions. Zigler, Hodgden, and Stevenson (1958) found that mentally retarded children were more persistent at a task than normal children when social reinforcement was given. They hypothesized that retarded children were more deprived of social interaction and therefore had an increased responsiveness to it. Paris and Cairns (1972) found that using an unusual term, "ahwe", to mean "good" caused retarded children to perform at higher rates than using "good" or "fine" and suggested that this could be due to the exotic nature of the word and the fact that the children were not satiated on it.

When applying social reinforcement several important techniques must be remembered. The social reinforcement must be contingent on the behavior the teacher wishes to increase. Noncontingent social reinforcement (i.e., reinforcement that occurs regardless of the actions of the child) has been shown to have no effect on behavior, while social reinforcement that occurs as a result of a specific behavior does change behavior (Dusek & Dietrich, 1973; Pawlicki, 1972). The teacher should ordinarily be physically close to the child, as this increases the power of praise and should make the affect in her/his voice fit with the type of reinforcement, as this has been shown to affect the power of the reinforcer, especially for those children who are most dependent on the teacher for approval (Todd & Nakamura, 1970). The teacher should also accompany praise, at times, with pats, hugs, and other physical contact. She can also increase the power of praise by getting the children into the act by having them praise each other (Grieger, Kauffman, & Grieger, 1976; Solomon & Wahler, 1973) or by having a special "praiser", such as the principal, come into the classroom to tell of good reports s/he has heard (Copeland, Brown, & Hall, 1974). The power of approval as a management tool has been shown to be very strong, and should be applied as consistently in the classroom.

Primary Reinforcement

Although social reinforcement has been suggested as the best form of positive management to try, there are times in which it is not enough. Some children do not respond to it for various reasons. They may not have been exposed to it before and have had little contact with positive interaction with adults, or they may be satiated with it because they have heard it too often. The teacher may also find her contingent attention ineffective when it is less reinforcing than the peer attention that the child is receiving for behaving inappropriately. When these problems are apparent, the teacher should look to more powerful forms of reinforcement. (These other forms can also be effective in helping the teacher increase positive interactions with her class by giving her a set program and schedule to follow.)

The first form of reinforcement that requires more intervention materials than the teacher's own social skills, is the direct administration of a primary reinforcer. The teacher can administer these reinforcers without prestated contingencies, s/he can let the child know what can be expected for certain behaviors before they occur, or s/he can write a contract with the child so that both parties (teacher and child) will know what behaviors are expected and what rewards will be given. Primary reinforcement should always be paired with social reinforcement because the effects are often additive and because it will be desirable to later wean children off of primary reinforcement and back onto social reinforcement. Pairing social reinforcers with primary rewards often increases the power of social rewards (Wagner & Paul, 1970).

Stated and Unstated Contingencies

A very simple manner in which to deliver primary reinforcement is to give the child a treat or preferred activity immediately after a desirable behavior has occurred without stating any kind of contingency before the behavior is displayed. For example, the teacher might make a surprise announcement that children who have completed their work may have extra free time or s/he might deliver a piece of candy to a child for sitting quietly, though the child was never told that sitting quietly would earn a treat.

Delivering rewards without a prestated contingency should not be confused with noncontingent rewards, which we have mentioned earlier. Noncontingent reinforcement refers to a reward which is given regardless of the behavior performed by the child. Reinforcers delivered without warning must be directed to specific behaviors that the teacher wishes to increase. The teacher must know which behavior s/he wishes to increase and administer the reward only after that behavior has occurred.

When using primary reinforcement, the teacher often will cue the child that certain behaviors will earn certain rewards. This cue is usually included in an "If . . . then" statement such as "If you finish your math, then you may spend 15 minutes in free play." (This has sometimes been referred to as "Bribery").

Resick, Forehand, and Peed (1974) conducted an experiment designed to compare the effects of a prestated (expected reward) and unstated contingency using 4-to-6-year-old middle class children. Children were either told or not told that they would be rewarded for cleaning up toys quickly. This was continued over a series of trials, and results showed that the effects of the unstated contingency lasted longer than those for the prestated group. The children who worked under the prestatement condition worked faster on trials during which the statements were made but not during other trials. Samaan (1972), in his work with a seven-year-old enuretic child, concluded that contingencies which were clearly stated (so that they were understood by the child) were more effective than those not clearly stated. Arguments have been presented that the child will perform better if s/he knows precisely what is expected of him/her and what rewards will be presented (Dee, 1972).

An interesting management program of this prestated type was applied in a first grade classroom to increase racial integration (Hauserman, Walen, & Behling, 1973). The children were told that if they sat with a "new friend" (race was not mentioned) during lunch, they would receive a treat during the free time following lunch. Integration increased in the lunch period and also during the free play time. Math Performance (Brooks & Snow, 1972), bed wetting (Kimmel & Kimmel, 1970; Tomlinson, 1970), toothbrushing (Lattal, 1969) and room cleaning (Lyman, Rickard, & Elder, 1975) have also been treated successfully using this simple "If . . . then" form of management.

In summary, it appears that there is usually little or nothing to be lost by stating the contingencies of reinforcement to children. In fact, some children are likely to change their behavior more quickly if they are told about the relationship between their behavior and its consequences. It is important to keep statements about contingencies simple, clear, and within the children's understanding, however, and to make sure that the contingencies are actually applied as stated. Furthermore, it is always possible to reward particularly desirable behavior as an unexpected "bonus", even though that particular behavior was not included in the original contingency statement.

Group Contingencies

Behavior management techniques which employ rewards can be used when working with a group as well as when working with an individual child. These group contingencies will be discussed in greater detail under the section on token reinforcement. Here we will present only a brief discussion of how the procedure can be used.

In some group contingencies either everyone wins the reward or no one does. Group contingencies were initiated by Switzer, Deal, and Bailey (1977) in three classrooms that had an average of one and a half to four items stolen per day. Each day 10 "stealable" items such as pencils, erasers, and other objects were placed around the rooms. The children were told each day that they could all earn ten minutes of free time if nothing was stolen. This was compared to no controls and to lectures on stealing. Only a few instances of stealing occurred after the group contingency was begun. Barrish, Saunders, and Wolf (1969) divided a disruptive class into two "teams". The teams played a "good behavior game" to see which one could get the smallest number of checkmarks for disruptive behavior. The winning team got special privileges. However, both teams could "win" by keeping their number of disruptions below a prestated level. Sulzbacher and Houser (1968) also used a group contingency to control "naughty finger" responses. The class was given a special recess and told that each time any pupil showed or referred to the naughty finger the whole class would lose one minute of their special recess time (this was technically a response cost punishment procedure, which we will discuss in more detail in another section).

In summary, group pressure and competition for rewards can sometimes be used to the advantage of the teacher and all the pupils in the class. However, one must be cautious and avoid a situation in which one child or a small group of misbehaving children are able to consistently sabotage rewards for the group. Whether or not group contingencies are tried should be decided by the teacher's knowledge of how the pupils in the class work together.

Contracts

The use of contracts with children is a more formal way to employ the "If . . . then" form of contingency management. As in other forms of management, contracts can be made between the teacher and an individual or between the teacher and a group. The contract is usually a written statement of what each party is going to do for and receive from the other party. They make explicit who will be responsible for what, make clear the expectations of everyone involved, and also help avoid the problems of changes occurring in one or the other persons.

An example of a contingency contract is one which involved a thirteen year old boy who refused to attend school and would tantrum and sit in the guidance office if forced to go (Vaal, 1973). He was placed under a contract with his parents and the school in which he was to go to school on time, attend classes, and remain in school until dismissed; in return he would be allowed to go to professional basketball games, go bowling, play basketball, visit home during lunch for a short time, and go to a neighbor's house. During the first six months of school, he failed to attend 94 percent of the school days, but once the contract was in effect he went on time everyday and returned after summer vacation with no problems.

Contracts are frequently written so as to mimic business contracts. They list specific terms and are signed by both parties and witnessed as a "legal" document. Weathers and Liberman (1975) suggested an alternative to this in a "family contracting exercise" in which both parties played a board game. They selected rewards using card categories that they thought the other parties would want, set priorities, empathized with each other on the difficulty of reaching desired goals, and compromised as they worked out "deals" according to the various difficulties presented by the behaviors desired. Advantages of the game format were that it allowed family tensions to be discussed without emotional overtones, it allowed compromise without "loss of face", and everyone was allowed input without the adults running over the needs of the children.

Regardless of the form taken by the contract, certain criteria should be met by all of them. They must offer rewards and be negotiated so that participation is voluntary, and all behaviors must be within the participant's repertoire (Weathers & Liberman, 1975). In addition, the teacher must be able to reward approximations within the limits of the contract so that behaviors can be shaped. S/he must be able to continuously evaluate the reinforcers to be certain they mean the same thing over time, and be willing to renegotiate because of changing needs. In addition, sanctions for failure to comply with the contract should be carried out against anyone who breaks the contract, and bonus clauses can be attached so that extraordinary performances can receive something extra (Stuart, 1971).

Many advantages of contracts, such as the clarity of responsibilities and requirements and the interactions involved between teacher and children, have been mentioned in this discussion. It is necessary, however, for the teacher to realize a possible danger spot in contracting: The contract must be just as binding on the teacher as on the pupil. The contract should be negotiated carefully so that the teacher does not agree to terms on which s/he will be unable to follow through. It is necessary during the negotiation for the teacher to keep in mind the manner in which this new contract fits into her/his teaching style and the needs of the individual or the class as a whole (Dee, 1972).

Fading Primary to Social Reinforcement

If the use of primary reinforcement is to be successful in producing lasting behavior change, steps must be taken to gradually wean children off of primary reinforcement and onto the type of reinforcement which occurs more frequently in the natural environment. A smooth transition to naturally occurring reinforcers can be promoted in several ways. First, as mentioned previously, including praise with the delivery of primary reinforcement increases the effectiveness of praise alone. Second, the amount of primary reinforcement can be gradually decreased during the behavior change program. Third, the schedule of reinforcement can be changed from a continuous schedule to an intermittent schedule in which reinforcement is delivered after increasingly longer periods of time or after increasingly more responding.

Continuous assessment of behavior will insure that the transition to natural reinforcers is not made too rapidly. If the teacher finds that behavior is deteriorating during the transition period, s/he can go back a step (e.g., lower the requirement for reinforcement) until the behavior improves and appears stable, and then proceed more slowly with the next step. It is also important to remember that a conditioned reinforcer must be occasionally associated with some form of primary reinforcement in order to remain effective.

Token Reinforcement

Sometimes it is difficult or impossible to provide reinforcers themselves immediately when a child performs a desirable behavior. For example, it may be impossible to use a toy or an activity effectively as a reward because it can't be given immediately for each desirable behavior. (Remember that positive reinforcers should be given often, in small amounts, and immediately after a good behavior is exhibited if they are to be most effective.) One potential solution to this problem is to use "token" reinforcers, i.e., to give the child things like plastic or metal discs or points marked on a card that s/he can accumulate and later exchange for "backup" reinforcers that s/he wants. Token reinforcers work essentially the same as any other conditioned reinforcers (like praise), so it is important to keep in mind the things we have already said about positive reinforcement. In addition, however, it is important to remember that tokens usually have little or no value to children until the children connect them with the things tokens can "buy". (Money, which represents a complex token reinforcement system in our society, has no value to most children until they learn how to spend it.) Consequently the first step in introducing a token system is to teach the students the relationship between the tokens they earn and the back-up reinforcers that can be purchased with the tokens. To teach the token-back-up relationship, the teacher should give the child some free tokens and let him exchange them for back-ups. Gradually, the teacher can introduce delay in exchanging the tokens, earning tokens, and saving tokens.

With severely handicapped children, the teacher might want to begin with a very simple exchange of one token for a reinforcer. After the child has learned that getting a token means that he can exchange it for a "goody", he may be given tokens as rewards for following simple instructions or for performing some other simple task. Next the teacher might work on getting the child to hold on to the token for a short while before exchanging it for something (e.g., a potato chip or a sip of juice). Later, putting the token in a "bank" or saving up several before trading them in might be worked on. With more advanced children, the system of earning and exchanging can get rather complex. In fact, a miniature "economy" might be established with the tokens being a convenient and pervasive medium of exchange in the classroom (hence the term "token economy").

Token reinforcement may be kept very simple or it may be made very complex (in the case of a highly developed "economy"). It may be applied to the behavior of a single child or employed with an entire class of children. Sometimes a token system is standardized and applied to many groups of children. A wide variety of items may be used as tokens (e.g., plastic or metal discs, beads, points marked on cards, homemade play money), and an extremely long list of things have been used as back-up rewards (foods, clothing, toys, money, material goods, activities, and privileges of all kinds). A very large amount of research on the topic of token reinforcement has been reported during the past 15 years (see Kazdin, 1977). Generally, this research shows that token reinforcement can be (but isn't always) a very powerful and efficient tool in teaching and managing behavior.

Since the early work of Birnbrauer, Wolf, Kidder, and Tague (1965), we have known that tokens can be useful with severely handicapped children in the classroom. However, it behooves the teacher who is selecting reinforcement techniques to consider the following advantages and disadvantages of token systems before making a choice.

Advantages:

1. Since a wide variety of back-up reinforcers can be provided, problems of satiation (loss of reinforcer effectiveness with repeated presentations) can usually be avoided.

2. The same types of tokens can be given to several children who have different preferences for back-up reinforcers, avoiding the problems involved in trying to deliver different reinforcers to individual children immediately for desirable behavior.

3. Tokens can be saved up toward the purchase of a highly desirable but large, long, or expensive back-up reinforcer which otherwise could not be made available or would be earned by a single response, and the child can observe progress toward the purchase by noticing his accumulation of tokens.

4. The teacher can continue teaching and administer reinforcement with little or no disruption, whereas if activities or toys were provided immediately the class could not continue.

Disadvantages:

1. Tokens introduce an element of artificiality into the classroom (i.e., they are not naturally occurring social rewards).

2. Close monitoring of the system may be necessary to prevent stealing, cheating, losing tokens, playing with tokens during work time, etc., especially when more complex systems are instituted.

3. Transferring control from tokens to more natural social rewards may present difficulties.

We recommend that in addition to the advantages and disadvantages we have listed the teacher should keep the following guidelines in mind. First, try simpler and more natural techniques, such as clear instructions and contingent praise, before instituting token reinforcement. Objective measurement of behavior will tell you whether or not you need to go to a more complex technique like the use of tokens. Second, if you decide to use tokens, keep the system as simple and efficient as possible. Try to find an easy-to-use and readily available type of token, use as many "natural" back-ups as possible, and keep the time used for dispensing and exchanging tokens to a minimum. Third, be certain always to pair social praise with the delivery of tokens, since you will eventually want praise and other more natural social consequences to take the place of tokens. Fourth, keep the emphasis on earning tokens for desirable behavior--on positive reinforcement--and minimize the use of token loss for undesirable behavior. Taking tokens away contingent on misbehavior is a type of punishment (technically known as "response cost", since each inappropriate response "costs" the child something) that we will discuss later.

Shaping and Chaining

The teacher who expects that children will emit correct responses almost automatically and that all s/he has to do is be ready with reinforcement is going to be very disappointed. Teaching requires considerable skill in being able to "build" appropriate performances. Two important tools for building the behavior the teacher wants are shaping and chaining. Shaping means rewarding successively closer approximations of a correct response. The teacher must break the target response down into a series of steps, beginning with a step the child can already perform and leading to the final goal. For example, in shaping the response of wiping one's face with a wash cloth, the teacher might first reinforce just holding the cloth, then moving the cloth toward the face, then touching it briefly to the face, and finally better and better attempts at wiping the face. The criterion for reinforcing the child is gradually increased as the child's performance improves, and earlier approximations are no longer sufficient to earn reinforcement. In a classic early research report, Wolf, Risley, and Mees (1964) reinforced successive approximations of wearing glasses by a young autistic boy. At first, the boy was reinforced for merely picking up and holding empty glasses frames. Then the criterion for reinforcement was raised to putting the frames to his face, then for wearing empty frames (with a special "roll bar" to keep them on his face), then for looking through prescription lenses, and so on until he was wearing his own prescription glasses. Keep in mind that in shaping behavior, the original response that is reinforced (e.g., picking up and holding empty glasses frames) may not be part of the terminal goal (e.g., wearing prescription glasses) even though it is somehow an approximation of the terminal goal.

Chaining involves teaching an ordered sequence of component behaviors constituting a task. For example, Snell and Smith (1978) listed twenty possible components in face-washing:

1. turn on water
2. pick up wash cloth
3. wet cloth and squeeze out
4. wet entire face with cloth
5. pick up soap and soap the cloth
6. wipe soapy cloth across face
7. scrub face with cloth
8. rinse cloth and squeeze out
9. wipe face with cloth
10. rinse cloth and squeeze out
11. open eyes, look in mirror for soap

12. wipe face with cloth
13. rinse cloth and squeeze
14. wipe face clean with cloth
15. rinse cloth and squeeze
16. hang face cloth on rack
17. rinse sink
18. turn off water
19. dry face on towel
20. straighten towel

Some individuals may not need to be taught every one of these 20 components as a separate skill in sequence because they master several of them at once; others may need to be taught an even more finely "graded" chain of behaviors. The point is that the chain must be matched to the behavioral characteristics of the child: If it is too "fine" (i.e., has too many tiny steps), then teaching will be inefficient; if it is too "coarse" (i.e., has steps that are too large), then too many errors will occur.

Behavioral chains may be taught in a forward or backward sequence. In forward chaining, teaching begins with the next step in the sequence (the very first step, if the child has not mastered it) and proceeds with steps leading to the end of the sequence. Reinforcement is given when the child completes the step that is being taught. In backward chaining, the last step in the sequence is taught first, and teaching proceeds by adding new steps in reverse order, ending when step number 1 is taught. Reinforcement is given only after the last step in the chain is performed.

Some behaviors are usually most efficiently taught using forward chaining, others using backward chaining. Spelling, for example, is usually taught as a forward chain. Putting on pants, however, lends itself to backward chaining. The last step in putting on pants (i.e., pulling them up the last few inches) is usually taught first, and the first steps in the sequence (i.e., putting feet in pantlegs) are usually the last to be mastered.

Shaping and chaining are frequently used together to teach new skills. Shaping is primarily a process of getting new behaviors into the child's repertoire; chaining is primarily a matter of putting component skills together so that the child can perform a task reliably and efficiently. The teacher's task is one of identifying the skills to be learned, breaking the skills down into approximations or components, setting up a program for making approximations or sequences of components likely to occur, and rewarding performance (see Snell, 1978, and Sontag, 1977, for more detailed discussion of these topics).

STIMULUS CONTROL

Stimulus control means that under specific circumstances (i.e., when certain stimuli are present) a particular behavior will be emitted; it will not typically be emitted except under those circumstances. When a behavior is under stimulus control, then presenting the appropriate stimulus (e.g., the question, "What is your name?") is sufficient to obtain the response (e.g., "Jimmy"). Another way of describing stimulus control is to say that a discrimination has been learned. As we stated in the introduction to this monograph, the bulk of education consists of teaching discriminations. We want certain social stimuli (e.g., another person approaching in a friendly manner) and symbols (e.g., words and numerals) to set the occasion for appropriate social responses (e.g., eye contact and smiling) and academic responses (e.g., reading and calculating). From basic skills to complex activities, teaching is largely a matter of bringing behavior under the control of appropriate stimuli so that it is desirable for its context and the abilities of the individual.

The process through which stimulus control (i.e., discrimination learning) is achieved is, primarily, reinforcement. That is, an appropriate response is reinforced in the presence of the stimulus we want to control it; reinforcement is withheld if the response is given in the absence of the stimulus. We can not provide a detailed explanation of ordinary discrimination training here. (For discussion of basic teaching procedures see Becker, Engelmann, & Thomas, 1971; Snell, 1978; Sontag, 1977). What we will discuss briefly are some particular problems that often arise in discrimination training with severely handicapped individuals. It is a comparatively simple task to teach normal children discriminations because, if the instructional materials and procedures are at all appropriate for them, they are capable of making responses and learning what is expected in only a few trials. Severely handicapped individuals, though, may have extreme response deficits and take many, many trials to learn a discrimination that is very simple for a normal person of their chronological age.

When the child does not perform a correct response readily so that it can be reinforced, there are several techniques the teacher might use to get correct responses going so that the discrimination can be learned. These prompting techniques include instructions, modeling, fading of prompts, and delay of prompts.

Instructions

If a child is not responding appropriately, the first technique to try is telling him/her what to do. If the child follows instructions reliably, then his/her behavior is under stimulus control. An important point to remember is that the lack of stimulus control may be due to the fact that instructions have been unclear, inconsistent, too complex, given inappropriately, or that compliance has not consistently been followed by reinforcement. Before assuming that a pupil can not follow instructions, the teacher should always:

1. Make sure the child is paying attention before giving the instructions.

2. Make sure the instructions are as simple as possible, appropriate for the child's developmental level, and that they are given clearly.

3. In assessing the child's ability to follow instructions, give the instructions several times (i.e., give several trials) and give the child ample time to comply on each occasion.

4. Offer immediate positive reinforcement for compliance, even if the child just attempts to make the response or only approximates what is expected.

Many times teachers are surprised to find that if they follow these recommendations children can and do follow their instructions. If the child does not follow instructions given according to these guidelines, then additional procedures may be used to bring the child's behavior under stimulus control.

Modeling

Showing the child what to do—demonstrating the appropriate response--may be a particularly effective way of prompting behavior. In fact, a great deal of what we learn is acquired by observing and imitating the models we see. Often one of the first skills taught to a severely handicapped individual is how to imitate. The teacher gets the child's attention, gives the instruction "Do this", "Raise your hand", "Point to your nose", etc., models the correct response, and reinforces a correct response or an approximation. A great deal of research shows the effectiveness of modeling as a strategy with handicapped children (Cullinan, Kauffman, & LaFleur, 1975).

Fading of Prompts

When children do not respond to instructions and models, they may be prompted to give a correct response in other ways. Prompts may take the form of physical guidance (the child may be "moved through" the behavior or given partial physical assistance), manual cues (e.g., pointing to or tapping a correct choice in a group of stimuli), or cues placed in or on the stimuli to be discriminated (e.g., a color or picture cue added to a word). If a child does not follow simple verbal commands, then the command might be given and the child might be physically guided through the response and then be given a reinforcer (Whitman, Zakaros, & Chardos, 1971). For example, after saying "Raise your hand", the teacher might physically prompt the response by grasping the child's hand and raising it above his head. (We are assuming here that the child has already been taught to sit quietly and look at the teacher when his/her name is called.) The full physical prompt might then be faded in gradual steps over many trials, so that early in the fading sequence the teacher releases the child's hand just before it is completely raised and late in the fading sequence the teacher has merely to touch the child's hand to effectively prompt the response. Eventually, the physical prompt is completely faded out so that only the instruction "Raise your hand" is necessary to obtain the response (i.e., hand-raising is under stimulus control of the verbal instruction).

In the case of teaching children visual discriminations (e.g., to identify pictures, symbols, or words), the teacher might display a choice of stimuli to the child and offer reinforcement for a correct choice. A prompt might consist of the teacher's pointing to the correct choice or marking the correct choice with a color cue (if the child already has learned the color discrimination). The pointing or the color cue might then be gradually faded out.

Fading of prompts has often been recommended as an effective strategy for bringing behavior under appropriate stimulus control. No doubt it is a very useful technique in many circumstances. However, recent studies with children who are autistic and/or severely retarded show that the usual fading procedures are frequently a hindrance to the discrimination learning of such children (Arick & Krug, 1978; Rincover, 1978). They tend to get "hooked" on the prompt. That is, they keep on responding to the prompt rather than learn the discrimination of the intended stimulus unless the prompt that is used and faded is actually a part of the stimulus itself (Rincover, 1978; Schreibman, 1975). Ordinarily, the classroom teacher probably will not have the time and resources to arrange such "within-stimulus" prompts to guide discrimination learning. Fortunately, there is another procedure, called "delay", which teachers might consider as an alternative to fading prompts.

Time Delay of Prompts

Instead of providing a "full" prompt and then fading it out by using successively less obvious "partial" prompts, the teacher might try always using a standard "full" prompt but delay its presentation for gradually longer intervals of time after an instruction (or other stimulus) is presented. This time delay strategy has been successful with a variety of behaviors of severely handicapped children (Striefel & Wetherby, 1973; Striefel, Wetherby, & Karlan, 1976; Stremel-Campbell, Cantrell, & Hale, 1977; Touchette, 1971). For example, Striefel, Bryan, and Aikins (1974) gave instructions to retarded children and, if the child did not emit the desired response, they then prompted the response by modeling it (imitation had previously been trained). At first the teacher prompted (modeled the response) immediately; then a gradually increasing time delay was inserted between the instruction and the prompt. In effect, the child had just a little longer time to respond correctly before being prompted on each trial. Eventually, the children began responding correctly before the prompt was given. At that point, stimulus control had been shifted from the prompt to the verbal instruction, i.e., the teaching objective had been reached.

Not very much research has been done yet using time delay of prompts. However, it appears that it may well be a good alternative to fading prompts with many severely handicapped persons.

Vicarious Prompting

Sometimes teachers provide reinforcement for one pupil in the hope that another child in the class will behave better. The teacher's hypothesis is that observation of another child being reinforced will vicariously reinforce or prompt desirable behavior in the observing child. Vicarious reinforcement has been investigated in several studies (Broden, Bruce, Mitchell, Carter, & Hall, 1970; Kazdin, 1973; Kazdin, Silverman, & Sittler, 1975). In our own research (Birnbrauer, Hopkins, & Kauffman, 1978), we have investigated the effects of vicarious prompts, i.e., calling attention to and praising (and perhaps tangibly reinforcing) the appropriate behavior of one pupil while another is misbehaving with the explicit intent of prompting the misbehaving child to behave appropriately as well. For example, if a teacher sees Robert pushing and shoving in line s/he may say to Richard, "Since you're standing quietly and not bothering others, you may go first." If this kind of prompt works, it has a lot to recommend it. It is economical of time and effort, consistent with behavior principles, avoids reinforcement of the misbehaving child, provides a model for the miscreant, and provides reinforcement for good behavior.

The results of our research suggest that vicarious prompting is a subtle, indirect control technique. It is low in cost (of time and effort), positive, and an effective alternative to other techniques (e.g., time out or response cost punishment), but only under conditions in which the behavior of most of the group is already appropriate. It is not likely to be a successful technique when the group is highly inattentive or disruptive. Thus, a teacher would be well advised to use more powerful, direct methods of control initially with a hard-to-manage group and shift to vicarious prompts only after a high level of appropriate, attentive behavior has been achieved.

NEGATIVE REINFORCEMENT

Contrary to appearance and the way many contemporary writers use the term, negative reinforcement is not another word for punishment. Negative reinforcement, instead refers to strengthening and sustaining behavior through avoidance or termination of aversive (unpleasant, painful) consequences. An everyday example is provided by the seatbelt buzzer in cars—people buckle the seatbelt (or perhaps tie it or disconnect it) to turn off (escape from) the buzzer or keep it from coming on in the first place (avoidance). An early clinical example with psychotic children was provided by Lovaas, Schaeffer, and Simmons (1965), who used escape and avoidance of electric shocks to teach social behaviors. An educational illustration is provided by Greene and Hoats (1969) who used television distortion in a negative reinforcement paradigm with a mildly retarded young man. The task was one that he could complete while watching TV. With the aid of electronic gadgetry, the experimenters arranged the set so that the picture would distort if the student did not maintain a certain rate of working. Thus, by working at the desired rate, the worker could avoid distortion of the TV picture, and his work rate improved.

Negative reinforcement is not very often applied explicitly in educational programs, partly because it refers to a wide range of specific procedures which are better discussed separately and partly because it requires arranging aversive consequences and then arranging ways for the students to avoid them. The concept of negative reinforcement, however, is very useful in understanding many difficulties in classrooms and the behavior of many teachers, or rather of some teachers on some occasions. For example, students who are known to throw severely disruptive tantrums or to become physically aggressive when thwarted or instructed to complete a task often are not asked to comply and are allowed to have their own way. The teacher thereby is avoiding unpleasant scenes and his/her behavior is controlled by negative reinforcement. Wahler (1976) calls this situation the "negative reinforcer trap", and in his experience has found it to be "the most common process in the development of deviant child behavior" (p. 518).

Negative reinforcement also plays an important role in maintaining phobic behavior, and sometimes it is difficult to see that a person's behavior may be best viewed and treated as if it were "phobic". A child who has been bitten by a dog may run from all dogs (and creatures that look like dogs) to avoid being bitten again. The behavior continues because it obviously is successful; the child is not bitten again. That situation is easily "diagnosed" and treated, because the child will say that he/she's afraid of dogs or one can see it in the child's reactions to dogs. School phobias and resistance to certain areas of instruction, say reading, may be more difficult to diagnose, however. One of the difficulties with punishment (and one reason why behavioral psychologists emphasize the importance of arranging instruction so that the chances of success are high) is that once punishment or failure is experienced the child may avoid the task, find excuses for not undertaking particular assignments, become ill, and the like. Such behavior is maintained by negative reinforcement. Teachers should consider the possibility that a problem behavior is under such negative control and treat the problem as if the child were fearful, i.e., by introducing the avoided task in small doses, by disguising it, and by pairing it with frequent positive reinforcement. Often such refusals to attend school and cooperate are labelled pejoratively as "ornery", "stubborn", "manipulative" and so on, which leads people to employ punishment programs. To punish behavior maintained by negative reinforcement would seem to exacerbate the problem.

A second reason for being cognizant of the concept of negative reinforcement is that it may be the basis of success of any punishment program, such as one employing time out from positive reinforcement or response cost. Punishment follows inappropriate acts, but the aim, of course, is that inappropriate behavior not occur, and that the student engage in appropriate behavior, thereby avoiding the punishment. Thus, ways of avoiding the punishment should be encouraged and reinforced positively. Notice also, however, that the appropriate substitute behavior is also being reinforced negatively—by avoidance of the punishment. Often, it is impossible to say which form of reinforcement, positive or negative, is operative. Perhaps, both need to be operative for enduring behavioral changes.

Negative reinforcement has been used successfully, although as we have said, perhaps not labelled as such. Kaufman and O'Leary (1972), for example, compared negative and positive reinforcement in their classes for emotionally disturbed adolescents and found no differences either in effectiveness or in student reactions. In their positive reinforcement condition, tokens were placed in the students' "banks" as the children earned them through appropriate responses. In the negative reinforcement condition, the pupils' banks were filled at the beginning of the periods and tokens were taken away whenever the pupils misbehaved. At the DeJarnette Center for Human Development in Staunton, Virginia, a negative reinforcement system has been in operation for about a year at the time of writing and seems as effective as the more cumbersome point (token) system that it displaced. Essentially, the children receive wrist bands which entitle them to all reinforcers. Misbehavior results in the temporary loss of the band. Thus, the children work to keep their bands or to avoid the aversive consequence of losing their bands.

Some children seem to be more responsive to negative reinforcement than an equivalent positive reinforcement system. Wasserman (1977) reported a case in which a 12 year old boy was managed by the threat of a negative report if his behavior failed to reach certain criteria. This system was successful, whereas previous plans with token reinforcers and other positive consequences had failed. Birnbrauer and Hopkins also experienced success by switching from a positive to a negative reinforcement plan with a nine year old disturbed and retarded boy who was dangerously disruptive while riding in a car with other children. At first, they set up a scheme in which the boy earned stars for each portion of the trip in which no misbehavior occurred. If his star booklet was filled when he reached home, he was entitled to a number of privileges and treats. This plan did not work. Next, they gave the driver a book full of stars, from which a page was torn after each misbehavior. The boy's behavior improved immediately, and on last contact the program was still being successful.

Negative reinforcement, in summary, is a concept which is often helpful in understanding school problems. It is worthwhile considering the possibility that some undesired behavior is being maintained by avoidance of aversive consequences. It is a concept which underlies success with punishment programs and reminds us to make certian that the child can and, indeed, will avoid the punishment and receive positive reinforcement for doing so. Negative reinforcement can be applied directly, and its various applications are discussed separately, but not explicitly, under the headings as "response cost", "time out", and "group contingencies."

EXTINCTION

Extinction, as a procedure, means that reinforcement is withheld from behavior that was previously reinforced. As a process, it means that behavior which has previously been reinforced will decline in rate or strength when reinforcement is withheld. In a classroom, an extinction procedure usually means ignoring a behavior that is inappropriate. It is assumed that the behavior has been reinforced by attention, even though this attention may have been scolding and reprimands. Extinction differs from time out in that instead of removing the child from the setting, removing materials, or obviously turning away, the teacher simply does not respond in any way to the child's presence as long as the inappropriate behavior is occuring.

Ignoring has been shown to be effective in several different settings and with different behaviors. Allen (1973) worked at a camp with an eight-year-old brain-damaged boy who engaged in fantasizing and talking about penguins excessively. The camp staff ignored all penguin talk and all questions that regularly led into talk about his "pets" such as, "You know what?" The rate of occurrence of this behavior dropped from 116 per day to less than one per day. In another study, a mother was trained to ignore all of a variety of tics displayed by her nine-year-old son, and this resulted in a substantial reduction of the tics (Schulman, 1974).

In the classroom, ignoring used alone has not proved to be very effective. Madsen, Becker, and Thomas (1968) found that disruptive behaviors increased when they were ignored and that the teachers participating in the study had a difficult time ignoring disruptive children while trying to conduct class. After the teachers were allowed to add praise for appropriate behavior to their discipline procedures, however, the inappropriate behaviors decreased. Blanchard and Johnson (1973) discovered that ignoring used alone did not affect classroom behaviors but that ignoring plus priase did. Other studies have shown that the combination of praising appropriate and ignoring inappropriate behaviors is a powerful method of behavior control (Broden, Mitchell, Carter, & Hall, 1970; Goodlet, Goodlet, & Dredge, 1970).

One problem inherent in the use of ignoring is that when a behavior is no longer reinforced, it typically shows a rise in frequency or duration before it declines (Hawkins, Peterson, Schweid, & Bijou, 1966). This acceleration followed by decline, when graphed, is known as an "extinction curve". An example was provided by Allen, Turner, and Everett (1970) when they instituted a program involving ignoring the tantrums displayed by a four-and-a-half-year-old boy. Tantrums changed in duration from a baseline level of five minutes to 27 minutes on the first day of extinction, fifteen minutes on the second day, and four minutes on the third day before finally disappearing.

Another problem found in the use of just ignoring undesirable behaviors has been that children often have a hard time knowing exactly what is being ignored. Sajwaj, Twardosz, and Burke (1972) showed that when teachers ignored one response of the child, other behaviors changed too, not just the target behavior. Although the target behavior came under control as the experiment progressed, learning was very slow.

Ignoring of undesirable behaviors should be used carefully. Extinction should not typically be tried with distructive or hurtful behaviors because of the dangers to the child and others. It should also be used only for behaviors for which the teacher can tolerate initial increases. One final note of caution about the use of ignoring is to avoid giving any attention to behaviors once they have been placed under extinction. Attention given occasionally might then result in their occurring for a longer time and with greater intensity.

PUNISHMENT

Research on the effectiveness of punishment techniques is meager in comparison with studies regarding the use of positive reinforcement. Ethical and practical considerations have precluded the investigation of certain methods of punishment. In addition, psychologists and educators have typically espoused the notion that positive techniques are more desirable and more effective than punishment for changing inappropriate behavior. Recently, however, it has been recognized that punishment, applied systematically and according to certain guidelines is an effective and humane tool for suppressing specific undesirable behavior.

The term punishment refers to the process of decreasing a behavior by presenting an aversive consequence or removing a positive event contingent upon the occurrence of the behavior. Punishment is not synonymous with inflicting pain or suffering, and painful consequences are not always punishing. An event is punishing only if it has the effect of decreasing the rate of the resonse that it follows; and if a consequence decelerates a response, then it is a punishing consequence regardless of whether it involves pain.

Punishment may take either of two forms: (1) removal of a positive reinforcer, or (2) presentation of an aversive stimulus. In this section we will discuss various procedures which fall into each category.

Removal of Positive Reinforcers

Time Out

Time out from positive reinforcement, a procedure which involves following a given behavior with an interval of time in which reinforcers are no longer available, has been shown to be an effective technique for suppressing specific undesirable responses. Time out has been used successfully with children to modify a wide variety of behavior problems, among them aggression (Calhoun & Matherne, 1975; Clark, Rowbury, Baer, & Baer, 1973; Firestone, 1978), tantrums (White, Nielsen, & Johnson, 1972), inappropriate vocal behavior (Calhoun & Lima, 1977, Jackson & Calhoun, 1977; Lahey, McNees, & McNees, 1973), self-injurious behavior (Dougherty & Lane, 1976; Evans, 1976; Solnick, Rincover, & Peterson, 1977; White, Nielsen, & Johnson, 1972), self-stimulation (Pendergrass, 1972; Sachs, 1973), chronic vomiting (Wright, Brown, & Andrews, 1978), noncompliance (Mansdorf, 1977; Sachs, 1973; Scarboro & Forehand, 1975) and disruptive classroom behaviors (Calhoun & Lima, 1977; Foxx & Shapiro, 1978; Ramp, Ulrich, & Dulaney, 1971; Spitalnik & Drabman, 1976). In this section, we list various time out strategies, discuss some important parameters to be considered before implementing a time out procedure, and review guidelines for the legal and ethical use of time out. First, we describe five different ways time out may be administered or achieved.

1. In the contingent observation procedure (see Gast & Nelson, 1977), the misbehaving child is told to move to a specified area of the room in which he can observe, but not participate in the ongoing classroom activity. From this position, the child views his/her classmates behaving appropriately and consequently receiving attention from the teacher.

2. In a second type of procedure, exclusion time out, the child is moved away from the activity to another part of the room where he cannot observe his classmates participating in appropriate activities (e.g., Firestone, 1978).

3. A third procedure, seclusion time out, involves placing the child in an isolated room, void of opportunity for reinforcement, following inappropriate behavior. This procedure provides greater assurance that reinforcement will be effectively removed, since "contingent observation" may result in unintentional reinforcement of misbehavior by adults or peers (e.g., Clark, Rowbury, Baer, & Baer, 1973). An unusual form of seclusion time out was reported by Zeigob, Jenkins, Becker, and Bristow (1976). Using a procedure they called "facial screening", Zeigob et al. pulled a bib over the face of a 7-year-old nonverbal schizophrenic boy for 10 seconds contingent on inappropriate handclapping behavior. This brief visual seclusion from the environment was highly effective in reducing the inappropriate response.

4. Removal of adult social attention and/or other reinforcers for a short time is another effective means of delivering time out contingent upon misbehavior (e.g., Barton, Guess, Garcia, & Baer, 1970).

5. Time out may also involve the temporary (e.g., for 10 minutes) loss of opportunity to earn positive reinforcers (e.g., Foxx & Shapiro, 1978; Spitalnik & Drabman, 1976).

The choice of time out procedure will depend on the type of reinforcement program being used in the classroom, the type of misbehavior being dealt with, and the resources available to the teacher. Seclusion time out can be used successfully only when a small, safe time out room is available. Removal of adult social attention and instructional materials is obviously insufficient for dealing with dangerous or seriously destructive behavior. In short, one must consider the setting, the behavior, and the child's typical response to the removal of various types of reinforcers. The most important thing to remember is that to be effective the time out procedure must involve the consistent contingent removal of opportunity for reinforcement of the target behavior.

Parameters of Time Out. The following should be considered in planning the use of time out procedures (see MacDonough & Forehand, 1973):

1. The importance of the reinforcing value of the natural environment was demonstrated in a study by Solnick, Rincover, and Peterson (1977). They found that time out effectively reduced spitting and self-injurious behaviors of a severely retarded boy only when they enriched the "time in" situation (natural environment) by providing more social interaction and substituting new toys for the old ones offered in the "impoverished time in" environment.

2. Verbal instruction versus physical removal to time out was discussed by Gast and Nelson (1977). They suggested that verbal instruction is the preferred method because it is less disruptive, requires less interaction with the child, and avoids the possibility of aggressive behavior being modeled by the teacher. Another advantage is that it allows opportunity for the child to demonstrate self-control in following the request. Physical removal of the child may be necessary if the child resists the verbal instruction to go to time out.

3. The inclusion of a pre-time out warning has been reported in a few studies (Kendall, Nay, & Jeffers, 1975; Miller, 1970; Zeilberger, Sampen, & Sloane, 1968) with inconclusive results.

4. The use of a verbal explanation in conjunction with time out has not been shown to enhance the effectiveness of time out (Alevizos & Alevizos, 1975; Gardner, Forehand, & Roberts, 1976). When time out administered with no explanation was compared with time out administered after a brief factual explanation, e.g., "Terri, you are going to time out because you are out of your seat", time out was effective in both conditions; the inclusion of an explanation did not further alter the effectiveness of time out. However, Hobbs and Forehand (1977) suggest that the inclusion of an explanation might promote consistency in delivering time out and might also increase the social acceptability of time out by teachers and others who work with children. If an explanation is used it should consist of a brief, factual statement so that undue attention to the child will be prevented.

5. Duration is an important variable in determining the effectiveness of time out. Short time out intervals of 15 seconds to one minute have been used effectively and are worth trying first with a child who has not been previously exposed to longer time out intervals (White, Nielsen, & Johnson, 1972). White et al. (1972) compared time out durations of 1, 15, and 30 minutes for suppressing the

inappropriate behavior of twenty retarded children. Fifteen and thirty minute time outs were equally effective. One minute time outs were effective only when they preceded the use of longer durations. The authors suggest starting out with very short time out durations since the duration may be increased if short intervals prove ineffective.

Hobbs, Forehand, and Murray (1978) compared time out durations of 10 seconds, 1 minute, and 4 minutes. Although even a 10 second time out reduced noncompliant behavior in 4 to 6-year-old children, the longer time outs were more effective and produced longer-lasting results.

6. Several studies have been conducted recently to determine the effectiveness of various schedules of time out. Clark, Rowbury, Baer, and Baer (1973) found that applying time out for every third or fourth inappropriate response was effective, whereas giving time out for every eighth inappropriate response was not. Their findings indicated that as the probability of a behavior being timed out increased, the rate of the response decreased. The relationship was curvilinear, suggesting that relatively low rates of misbehavior can be maintained by some intermittent schedules of time out. The results of Clark et al. (1975), Calhoun and Matherne (1975), and Hobbs and Forehand (1977) suggest that some intermittent schedules of timeout may be as effective as continuous schedules, especially when the response has previously been reduced to a low frequency.

7. The most common strategy of release from time out is to release the child after a set period of time, provided undesirable behavior has not occurred for a specified brief period immediately before release. For example, the minimum time out duration might be one minute, provided the child is calm for the last 10 seconds of the minute; if not, one waits until 10 seconds of calm has occurred before releasing the child. Hobbs and Forehand (1975) compared contingent release, i.e., requiring 15 seconds of nondisruptive behavior in time out before being released, and noncontingent release, requiring a fixed length of time in time out independent of behavior during time out. The contingent release condition was associated with less disruptive behavior during time out and was more effective in controlling behavior outside of time out as well. Thus, a contingent release appears to be better than noncontingent release.

In summary, it seems that: (a) moderate durations of time out are more effective than shorter durations; (b) intermittent schedules of time out (up to about every fourth misbehavior) may be nearly as effective as continuous schedules and are often more practical; (c) contingent release from time out is more effective than noncontingent release; (d) warning signals and verbal explanations do not appear to facilitate time out effectiveness; (e) verbal request is preferred over physical removal to time out; and (f) if time out is to be effective, the natural environment must be reinforcing to the child.

If time out is proving ineffective, the teacher might evaluate the environment and, if necessary, take steps to enrich it by increasing positive social attention or by adding new and interesting toys or materials. Another reason time out may fail to suppress undesirable behavior is that it may be serving as a positive reinforcer for the child. Solnick, Rincover, and Peterson (1977) found that an autistic girl was engaging in self-stimulatory behavior while in time out and that the opportunity to engage in this behavior made time out a reinforcing consequence for her disruptive behavior in the classroom. Their finding demonstrates the importance of monitoring behavior in the time out setting.

Guidelines for Implementing a Seclusion Procedure. After reviewing the major court cases concerning the use of time out, Gast and Nelson (1977) made the following recommendations for instituting legal and ethical seclusion time out procedures in the public school setting.

1. The reinforcers maintaining undesirable behavior should be identified.

2. Behaviors to be consequated with time out should be specified prior to implementation of the time out contingency.

3. Milder forms of time out such as withdrawal of attention, contingent observation, and exclusion time out should be tried before resorting to seclusion time out.

4. Before seclusion time out is instituted, the ineffectiveness of milder forms of time out should be documented.

5. A concise, written statement of time out procedures should be prepared by the teacher.

6. The time out room should be at least 6 x 6 feet, properly lighted and well ventilated and be free from objects and fixtures which are potentially harmful. It should provide means for continuous monitoring of behavior and should not be locked unless absolutely necessary.

7. Whenever time out is implemented, the following information should be recorded: the student's name, the behavior resulting in time out, time of day placed in and released from time out, total duration of time out, type of time out, and the child's behavior during time out.

8. The time out contingency should always be used in conjunction with a program to reinforce more appropriate social behavior.

9. When time out duration exceeds thirty minutes, a supervisor should be consulted to assess the appropriateness of continuing time out.

10. If the effectiveness of a time out procedure is questionable, an advisory committee including the teacher, principal, parent, and behavior specialist should be consulted.

Gast and Nelson (1977) emphasize the importance of applying time out procedures "judiciously, systematically, and with continuous evaluation." Procedures should be designed for the individual child and to facilitate self-control. While time out has proven to be an effective technique, remember that it is of limited use alone. Several studies have found time out combined with procedures to shape or differentially reinforce appropriate behavior to be highly effective (Creer, Weinberg, & Molk, 1974; Evans, 1976; Frazier & Williams, 1973; Miller, 1970; Wiltz and Gordon, 1974).

Response Cost

Response cost involves removing a positive reinforcer or invoking a penalty which requires some effort on the part of the individual being punished. An example of response cost is payment of the fine required for returning an overdue library book. Teachers frequently use response cost procedures such as requiring students to recopy work that is written sloppily or to relinquish free time for disrupting the class.

Response cost procedures are ideal for use in a token economy setting. Fines (token or point loss) are typically levied for rule infractions or specific target behaviors. Myers (1975) successfully reduced the self-injurious behavior (finger biting) of a 12-year-old retarded boy by removing one token for each occurrence of the behavior. The response cost procedure was significantly more effective than differential reinforcement of other behavior. Doleys and Slapion (1975) found response cost in the form of point loss effective in reducing verbal repetitions emitted by a mentally retarded adolescent. Iwata and Baily (1974) compared a response cost procedure with a reward procedure in a special education math class which employed the use of a token economy. The two programs were equally effective in reducing rule violations and off-task behavior, and both produced increases in the amount of work completed. Students had no preference for either program; however, it was observed that teachers tended to express more approval when the reward system was employed. Results suggest that teachers should make an effort to avoid becoming more critical when implementing a response cost procedure. In discussing possible side effects (e.g., aggression) the authors noted that researchers have found reward and cost programs to be equally effective only when tokens or points were given noncontingently and later removed for inappropriate behavior. They suggested that negative side effects of response cost have been reported in only those studies in which lost tokens had been previously delivered contingent upon appropriate behavior.

Overcorrection

Overcorrection, a procedure developed by Foxx and Azrin (1972), consists of two basic components: (1) overcorrection of the environmental effects of inappropriate behavior, and (2) extensive practice of relevant appropriate behavior. The first component, referred to as "Restitutional" overcorrection involves requiring the person who misbehaved to restore the situation to a condition greatly improved over that which existed before the misbehavior occurred. The second component, which involves rehearsal of appropriate behavior, is called "Positive Practice" overcorrection. Foxx and Azrin (1972) successfully utilized the combined procedures to eliminate the disruptive behavior of a profoundly retarded female. Whenever disruptions (e.g. overturning a bed) occurred, the subject was required to restore the upset furniture as well as straighten all other beds on the ward. Next she was required to apologize to each resident and staff member on the ward. Restitutional and Positive Practice overcorrection were also effective in eliminating stealing behavior exhibited by severely and profoundly retarded subjects (Azrin & Wesolowski, 1974). Individuals observed stealing were required to return the stolen item to the victim and to present the victim with an additional item identical to the one stolen.

When environmental disruption is not a result of misbehavior, Positive Practice Overcorrection alone can be implemented. Azrin and Powers (1975) reduced the disruptive classroom behavior of six emotionally disturbed boys by requiring them to rehearse appropriate behavior contingent upon being out of seat or talking out without permission. Autistic self-stimulating behavior in one autistic child and three severely retarded children was eliminated by the use of overcorrection procedures (Foxx & Azrin, 1973). Mouthing was suppressed in two children by brushing their teeth and gums with an antiseptic solution for two minutes following the response (Restitution). Headweaving was eliminated by the use of Functional Movement Training (Positive Practice) in which the subject was required to move her head in response to requests made by the teacher. Hand-clapping was similarly suppressed by requiring hand movements upon requests given by the teacher. Functional Movement Training was conducted for 5 minutes immediately following the occurrence of self-stimulation. Effects of the treatment were maintained by reprimands and an occasional application of overcorrection procedures.

Overcorrection has also been effective in modifying self-injurious behavior (DeCatanzaro & Baldwin, 1977; Harris & Romanczyk, 1976; Kelly & Drabman, 1977a), vomiting (Dukes & Seys, 1977), pica and coprophagy (Foxx & Martin, 1975), and thumbsucking (Doke & Epstein, 1975).

Some advantages of the Overcorrection procedure are that it is effective in producing immediate and lasting changes in behavior, it is widely applicable across behaviors, and it is often more acceptable to teachers and therapists than other punishment techniques. It requires active participation of the individual being punished and is educative in its provision for rehearsal of appropriate behavior. On the other hand, some overcorrection procedures are time consuming and require continuous adult attention. In addition, if overcorrection is to be successful, the teacher must be physically able to carry out the procedure. The manual guidance which is sometimes necessary in the initial sessions of the procedure may render Overcorrection impossible for use with older, aggressive students.

Restraint

Physical restraint is another punishment procedure which has been successful in modifying various inappropriate behaviors exhibited by severely and profoundly handicapped children. The procedure typically involves physically restraining the child for a brief period of time (30 seconds to 5 minutes) when the undesirable response occurs. Marholin and Townsend (1978) significantly reduced self-stimulation (twiddling) exhibited by a 10 year old autistic girl by holding her hands at her side for three and five minute periods. Other behaviors effectively suppressed by similar restraint procedures include inappropriate object play (Salzburg & Napolian, 1974), and pica (Bucher, Reykdal, & Albin, 1976). Restraint was used in conjunction with reinforcement procedures to reduce stereotypic body contortions (Barkley & Zupnick, 1976) and thumbsucking (Freeman, Moss, Somerset, & Ritvo, 1977).

Presentation of Aversive Events

Social Punishment

Social punishment in the form of verbal reprimands constitutes the most commonly used method of classroom punishment. Interestingly enough, a few studies have demonstrated that reprimands may serve to increase undesirable behavior. For example, Madsen, Becker, Thomas, Koser, and Plager (1968) found that an increase in the teacher's requests to children to "Sit down" were associated with an increase in out of seat behavior. Similarly, Thomas, Becker, and Armstrong (1968) found that blatant disapproval by the teacher significantly increased class disruptions when the frequency of praise for incompatible behavior was low.

In contrast, other investigators have found social punishment to be an effective technique for modifying inappropriate behavior. Moore and Bailey (1973) used a cueing device to instruct the mother of a three year old girl to approve and disapprove of her child's pre-academic and social behavior. There was a significant decrease in the child's "autistic-like" responding, and an analysis of the mother's behavior indicated that the key factor in the child's improvement was the mother's increased use of social punishment for undesirable behavior. Doleys, Wells, Hobbs, Roberts, and Cartelli (1976) compared timeout and positive practice with social punishment consisting of a verbal reprimand followed by glaring at the subject for 40 seconds contingent on noncompliance. Social punishment resulted in lower levels of noncompliance than either positive practice or time out, and relatively few applications were required.

Schutz, Wehman, Renzaglia, and Karan (1978) found verbal reprimands effective in reducing the occurrence of inappropriate verbalizations in two severely retarded institutionalized males. In our own research, conducted in a self-contained special classroom, we found the teacher's reprimands effective in reducing the self-stimulating behavior of a trainable mentally retarded and severely disturbed twelve-year-old girl.

Soft reprimands may often be very effective in reducing undesirable behavior. O'Leary, Kaufman, Kass, and Drabman (1970) demonstrated that softly reprimanding the child in a manner that did not draw peer attention to the misbehavior was more effective in reducing misbehavior than the louder reprimands which were employed during baseline: when teachers returned to loud reprimands, disruptive behavior increased.

In general, the research suggests that verbal reprimands will be most effective when they are mild and are used in conjunction with frequent praise for appropriate behavior.

Physical Punishment

Electric shock is an extremely effective punishment procedure which, for both ethical and practical reasons, is seldom used in a classroom setting. It is generally utilized only when an individual's behavior is potentially harmful to him/herself and when the behavior has been resistant to modification by less drastic aversive techniques. Corte, Wolf, and Locke (1971) found shock to be more effective than either isolation of social consequences or positive reinforcement for appropriate behavior in suppressing the self-injurious behavior of retarded adolescents. Shock punishment has been successfully employed to suppress dangerous play with electrical equipment (Bucher & King, 1971), persistent vomiting

(Kohlenberg, 1970), and dangerous climbing (Risley, 1968). (Note that shock and other types of physical punishment should never be used except by persons who are thoroughly trained and adequately supervised by experienced behavior therapists.)

More recently, studies assessing the efficacy of physical punishment have centered on the presentation of less painful stimuli for reducing inappropriate behavior. Sajwaj, Libet, and Agras (1974) eliminated the chronic rumination of a six month old infant through the use of unsweetened lemon juice. Whenever vigorous tongue movements (the behavior observed to consistently preceed rumination) were exhibited, 5 to 10 cc of lemon juice was applied to the infant's tongue. Contingent application of lemon juice has been successful in reducing public masturbation in a severely retarded seven-year-old boy (Cook, Altman, Shaw, & Blaylock, 1978) and tongue extension beahvior in a severely retarded three-year-old girl (Kelly & Drabman, 1977b).

Unlike electric shock, punishment through the use of lemon juice causes only mild discomfort and has little or no potential for abuse. Since all staff members who have contact with the child can be easily trained to administer lemon juice therapy, it can be used more consistently than shock. Such consistency promotes generalization of improved behavior because it avoids the problem of the child learning to discriminate staff members who will punish from those who will not. Sajwaj et al. (1974) noted that some irritation of the mouth occurred with their subject; however, the irritation was minimal and disappeared rapidly as fewer applications of lemon juice were required. They suggested that caution be taken to apply the lemon juice only when the head is upright in order to prevent aspiration and to apply only a small amount of the liquid with minimum force.

One final punishment technique worth mentioning is the use of contingent inhalation of aromatic ammonia. Tanner and Zeiler (1975) eliminated self-injurious behavior (face slapping) in a twenty-year-old institutionalized female by crushing an ammonia capsule under the subject's nose. The ammonia was applied contingent upon the subject's pushing her hair away from her face, which always preceeded face slapping. In another study, hairpulling by a four-year-old girl and finder biting by a four-year-old retarded boy were reduced by contingent aromatic ammonia (Altman, Haavik, & Cook, 1978). The authors noted that other presumably less aversive procedures, including reinforcement for appropriate behavior, response cost, verbal punishment, and handspanking, had been tried first and found ineffective. Baumeister and Baumeister (1978) have also documented the effectiveness of aromatic ammonia in eliminating severe self-injurious behavior. It should be noted that noncompliant individuals may present problems in administering the ammonia by leaving the area or holding their breath and postponing the punishment.

Advantages of the procedure are that, like lemon juice, it is inexpensive and can be administered by all staff *if they are properly trained and supervised*.

Guidelines for the Use of Punishment

It is essential that nonaversive techniques be attempted before initiating a behavior change program involving the use of punishment. When it is determined that the nonaversive techniques have been unsuccessful in producing the desired behavior change, Forness (1978) suggests that the choice of a punishment procedure be made in the context of a hierarchy of punishment ranging from very mild procedures in which the punishment is nearly self-imposed (self-disappointment and negative feedback) to more severe, externally imposed procedures such as seclusion timeout.

Punishment will suppress inappropriate behavior most efficiently when it is employed in conjunction with procedures designed to reinforce desirable responses (Azrin & Holz,1966). Kazdin (1975) notes that when reinforcement for appropriate behavior is provided, less intense aversive procedures are usually sufficient to suppress undesirable behavior. Determination of the proper intensity of punishment to use poses a dilemma for teachers and other change agents. Punishment of greater intensity usually results in greater response suppression than less intense measures; however, milder aversives may be equally effective and ethically more sound. The general rule of thumb is to administer mild to moderate forms of punishment first. If mild punishment is ineffective, more intense measures may be necessary; however, the teacher should keep in mind that *gradual* increases in punishment intensity facilitate the child's adaptation to punishment. In determining the type and intensity of punishment, consideration should be given to the particular behavior which is to be eliminated. Behavior that is extremely dangerous to the child may warrant a more immediate use of fairly intense punishment.

Punishment is most effective when it is initially delivered on a continuous schedule (after each occurrence of the undesirable behavior) rather than intermittently. As inappropriate behavior decreases, punishment should be faded to an intermittent schedule in order to avoid response recovery when punishment is discontinued (Azrin & Holz, 1966).

The effectiveness of punishment can also be enhanced by delivering it immediately (Azrin & Holz, 1966) and early in the response chain (e.g. Cheyne, 1971). For example, if stealing food in the cafeteria is the behavior to be suppressed, punishment will be most effective if it is administered as soon as the food is touched rather than after it is consumed.

Generalization of response suppression will be promoted by administering punishment consistently and in as many settings as possible (Corte, Wolf, & Locke, 1971). If punishment is not consistent across the settings in which the child exhibits maladaptive behavior, s/he is likely to learn that the behavior can "safely" be engaged in much of the time.

USING THE UNEXPECTED

Most of the techniques we have discussed up to now involve consequences that are quite commonly employed and fairly extensively researched. There are, however, some other "home spun" techniques that parents and teachers sometimes report using successfully. One thing these techniques seem to have in common is an element of surprise—the child just would not predict that an adult would respond that way to his behavior. Another thing these techniques have in common is that they are intrusive—they are hard to ignore. Finally, you should keep in mind that these techniques are not well researched as yet—there is little research revealing how useful they are or showing the circumstances under which they could be recommended. In fact, as far as we know, there is absolutely no research whatsoever on some of these techniques. Perhaps if and when the research is finally done, we will find that they are not good at all, that superstition was the only thing pointing to their value. This would not be a big surprise. Behavioral researchers have not infrequently found that long-held ideas about how to change behavior do not stand up very well when they are subjected to hard-nosed investigation. For example, Lovitt (1977) found in his research that some old-fashioned teaching techniques (the "tried and true" methods) produce excellent results, whereas others are worthless or worse.

In this section, we will discuss the following: imitating the child, the use of humor (including sarcasm and ridicule), and disproportionate reward.

Imitating the Child

Psychologists and special educators have done a lot of research on the effects of modeling (i.e., getting children to imitate), as we noted earlier. However, until recently there has been no research at all showing the effects of imitating children. Yet for years there have been anecdotes reported by psychologists, speech pathologists, teachers, and parents in which imitating a child was said to have some desirable effect on his behavior (see Kauffman, 1977). There are three different desirable effects reportedly produced by imitating the child: (a) In some cases imitating the child was said to have decelerated the imitated behavior; (b) in other cases the opposite effect (i.e., acceleration of the imitated behavior) was reported; and (c) in still other cases imitating the child was said to increase the child's ability or disposition to imitate an adult. Besides the anecdotal reports of the effects of imitating children, there are a few research studies. We will summarize the findings for each of the three reported effects.

Imitating to Decelerate a Target Response. The first research report in which imitating the child was used as a decelerating consequence involved a 7-year-old trainable mentally retarded girl (Kauffman, LaFleur, Hallahan, & Chanes, 1975). The girl was an extremely sloppy eater. Reprimanding her for sloppy eating, the research showed, slowed down her rate of eating a little and made her a bit neater, but did not improve her behavior satisfactorily. However, having an adult sit across the table from her and imitate her sloppiness (with some exaggeration) slowed her down and made her neater to a marked extent. However, in a second case reported by Kauffman et al. (1975) the animal-like yelping of a trainable retarded girl increased when the teacher imitated her yelping during instruction in language. In a later study, Kauffman, Hallahan, and Ianna (1977) had a teacher imitate a 12-year-old trainable mentally retarded boy's tongue protrusions. Imitating his tongue protrusions was much more effective than giving him verbal reminders to keep his tongue in his mouth. Neither of these case studies shows why imitating the child was effective and both leave open the possibility that a preceeding experimental condition (reprimands or reminders) or a component of the imitation technique (grasping the chin of the boy just before imitating his tongue protrusion) may have accounted for the results. Consequently, we did some additional studies.

In two case studies, Kauffman, Hallahan, Haas, Brame, and Boren (1978) used imitation of mildly handicapped children's spelling errors to improve spelling performance. Children learned their spelling words more quickly when the teacher imitated their errors and then showed them the correct models than when the teacher only showed them the correct models.

In our recent investigations we worked first with a 13-year-old severely disturbed and moderately retarded girl who had a peculiar self-stimulatory response we called tongue-pulling. (She'd open her mouth and give her tongue a quick little pull with her thumb and index finger.) Each day we had her in an individual teaching session in which she was being taught to touch various parts of her body or say certain sounds or perform various simple motor responses on command from the teacher. Each session was divided into two parts; in one part she was rewarded with small bits of food (e.g., raisins) for every third correct response, in the other part for every twelfth correct response. We used two different schedules of reinforcement (every third or twelfth correct response was reinforced) because we thought maybe imitating a child is merely a peculiar kind of time out in which the adult's behavior matches the child's. That is, we thought that perhaps the reason imitating the child is a decelerating consequence is simply that it is an interruption in on-going behavior and gives the child a very brief time out during which he or she can't be reinforced. If that is the case, then imitating the child (i.e., the time out) ought to have different effects when different schedules of reinforcement are in effect--the richer the schedule (the fewer the number of behaviors required for reinforcement), the more noticeable and effective the time out ought to be. We found no difference between the two schedules in the way imitating the child worked. In fact, we found that having the teacher imitate each tongue-pull had no effect on the girl's behavior at all. We knew that imitation did not serve as a time out.

We also thought that perhaps some novel nonimitative behavior might work just as well as an imitative consequence. So we had the teacher rub her shoulder each time the girl pulled her tongue. This novel nonimitative consequence had no effect on tongue pulling.

Our next thought was that imitation of a child is not a decelerating consequence unless it is somehow paired with some other consequence that is decelerating. So our next procedure was to pair a brief time out, during which the teacher gathered up whatever instructional and record-keeping materials she was using and turned away for 10 seconds whenever the girl pulled her tongue, with imitation. When this technique was used--imitate the tongue-pull, then impose time out for 10 seconds--tongue pulling did drop noticeably. Next we discontinued the time out but continued imitating the tongue pulling. Now the behavior stayed low in frequency, making us think that the teacher's imitation had become an aversive consequence. Would the behavior stay low in frequency if we had another teacher who had never given the girl a time out do the imitating? We found that it did. But we also found that when we stopped imitating tongue pulling, it did not return to its baseline level. Too, we later found that both imitating other self-stimulatory responses (e.g., nose tapping and head tapping) and applying time out for those responses had no effects or inconsistent effects. So, in the end, we were unable to show any really convincing evidence that imitating the child (or for that matter, the brief time out) was an effective decelerating consequence. If either of these techniques had any real effects, they weren't very durable or practical in the long run.

We tried imitating the self-stimulatory rocking behavior of a 19-year-old nonverbal severely retarded boy. Although there was no doubt that the boy noticed he was being imitated, for he watched the instructor intently and sometimes appeared to be amused by the imitation, it did not decelerate his rocking.

Thumbsucking is a behavior that a teacher could imitate rather easily. We tried it in two situations. In one situation, we dealt with a 7-year-old severely disturbed girl in a class with several other severely disturbed children.

To be brief, we found that when the teacher imitated the girl's thumbsucking the other children in the class started imitating her too. She came in for a good deal of taunting by her classmates, but her thumbsucking increased instead of decreasing, and the level of attention to task of all the children in the class dropped considerably. In the second situation, we dealt with a 7-year-old severely disturbed boy who was being taught individually. When the teacher imitated his thumbsucking, he made a game of it, slyly slipping his thumb in and out of his mouth to see what the teacher would do. He also sometimes asked why the teacher was taunting or teasing him and tried to hide under the desk when thumbsucking. Clearly, imitating the child was a miserable failure in these cases of thumbsucking.

We also tried having the teacher imitate the bizarre faces made by a 13-year-old severely disturbed, trainable mentally retarded girl. The setting was a small group (one or two other children) instructional activity in the back of the classroom. Before trying imitation, we tried having the teacher give the girl verbal reprimands for her inappropriate behavior. The reprimands reduced the frequency of bizarre faces below baseline level, as we stated earlier in our discussion of social punishment; however, adding an imitation of the faces to the reprimands did not produce any better results than the reprimands alone. There was no advantage in using imitation, since the reprimands were simple and effective. It is worth noting that the undesirable side effects of other children's responses and objection by the child did not occur in this study. These undesirable side effects also did not occur in previous studies by Kauffman et al. (1975, 1977) in which the subjects were trainable mentally retarded children in a class with other similar children.

In another study, we worked with a 9-year-old psychotic girl who had a high rate of self-stimulatory tapping behavior. She tapped objects or parts of her body repetitively with her fingers or tapped one object with another. Perhaps, we reasoned, imitating the child was not the important part of the technique in cases where it seemed to work. Perhaps it is just that the technique is really intrusive, something the the child cannot ignore. Matching what the child is doing, therefore, would not be important. The teacher worked with the child individually in daily sessions, having her perform simple tasks and then giving her some time to play. After getting baseline data, we had the teacher immediately bend over and put her face directly in front of the child's, almost touching, and look at her for a few moments (or until the tapping stopped) whenever the girl tapped anything during her play time. This procedure did not significantly decrease the girl's tapping. Next we had the teacher use the eye-contact procedure but, in addition, tap just like the child. Now the tapping gradually decreased over a period of about three weeks until it occurred only about one-fourth as frequently as during baseline. When the teacher's imitative tapping was discontinued and only the eye-contact procedure was used, the girl's tapping increased, but only slightly. Discontinuing the eye contact (going back to baseline conditions) did not result in further increases in tapping either. However, reinstating the contingent eye-contact plus imitative tapping procedure did produce a further slight decrease in tapping. So in this study we did find some evidence that contingent imitation of the child's behavior served as a decelerating consequence, but not as a very powerful one.

To sum up the research on imitating the child to decelerate a response, we'd have to say that it looks as if this is a "home grown" technique with very serious limitations. Imitation of the child's inappropriate behavior in a group situation seems likely to backfire, setting the stage for imitations by other children, holding the child up to teasing or ridicule by his peers, and perhaps increasing not only the target behavior but other undesirable responses as well. A teacher would be well advised to try other simple techniques, such as reminders or reprimands, before imitating the child. Sometimes imitation may work when other simple techniques have failed, but at this point we are not able to say why or to predict the situations in which it is likely to be useful.

Imitating to Accelerate a Target Response. The second case study reported by Kauffman et al. (1975) and our work with the girl who sucked her thumb in the classroom demonstrated that being imitated can be a reinforcing event, even when the teacher intends it as a punishing (decelerating) consequence. If imitating the child can serve inadvertently as an accelerating consequence for misbehavior, then could it be used purposefully to accelerate desirable responses? It seems reasonable to guess that the answer is yes. After all, adult attention, which has often been an inadvertent accelerator of misbehavior, can be an accelerating consequence for good behavior when it is given contingent on appropriate responses. However, there is as yet very little research showing whether or not imitating children is in fact a useful positive reinforcer. Several studies with normal children have shown that children tend to repeat a response for which they have been imitated, i.e., that being imitated by an adult is a positive reinforcer (Fouts, Waldner, & Watson, 1976; Miller & Morris, 1974; Parton & Priefert, 1975; Thelen & Kirkland, 1976). However, these studies have involved contrived experimental tasks that are very simple (e.g., dropping marbles in holes in the top of a box). Using imitation of the child as a positive reinforcer for therapeutic purposes in a more natural situation is a very different matter.

We tried imitating the handwriting performance of several severely disturbed primary-aged boys and found no particular benefit in imitating them. We also tried imitating the behavior of several severely disturbed elementary-aged children during toy-play sessions to see if imitating them would result in their playing with certain toys (the ones we imitated them for playing with) more than with other toys (ones we did not imitate them for playing with). We found no clear, consistent, replicable effects of imitating toy play.

Smeets and Kauffman (1978), working with four young trainable mentally retarded children, found that a nonimitative response served just as well as a matching response in reinforcing the children. That is, making the noise of the animal chosen by a child (e.g., "buzz-buzz-buzz" for choosing a bee) in a game was just as effective a reinfrocer as imitating the child's own behavior (i.e., dropping a marble in the same place as the child).

Other researchers have found that imitating children during toy-play sessions does influence the behavior of children predictably, but only children of certain ages. McCall, Parke, and Kavanaugh (1977) found that contingent imitative toy-play of normal infants 18 months of age resulted in their pausing and looking at the imitating adult more often than did contingent nonimitative play by an adult; this was not the case for infants 15 months or 24 months of age. These findings suggest that imitating the child might be an effective reinforcer for certain desirable social responses of children, but only during certain developmental periods. Whether or not severely handicapped children of a comparable mental age to the normal subjects used by McCall et al. would be similarly affected by an adult's imitation is an interesting research question.

In summary, there are so few data regarding the value of imitating children to accelerate particular responses that conclusions can not be drawn. Sometimes it may work, but not enough is known to predict just when it is likely to work with handicapped children. However, it seems likely that the often heard admonition never to emphasize what the child did that is incorrect (e.g., Bateman, 1971) is not well founded.

Imitating to Make the Child More Imitative. Getting the severely handicapped child to imitate an adult is frequently one of the first steps in a teaching program. Therefore, techniques that will increase the child's tendency to imitate could be very useful. One such technique is imitating the child.

Most of the research showing that imitating children makes them more imitative has been done with normal children (Kauffman, Kneedler, Gamache, Hallahan, & Ball, 1977; Thelen, Dollinger, & Roberts, 1975; Thelen & Kirkland, 1976). The children usually were imitated on a simple experimental task (e.g., dropping marbles in holes), and then the experimenter noticed whether or not they imitated an adult on the same task. Hallahan, Kauffman, Snell, Kneedler, and Richards (1977) found that imitating the severely retarded on a simple task (feeding "cookies" to a "cookie monster") made them more imitative of an adult who fed the cookie monster. Kauffman, Snell, and Hallahan (1976) presented data showing that imitating young trainable retarded children during imitation training increased their imitativeness of the teacher. However, in our work with institutionalized emotionally disturbed children we did not find that imitating the children made them more imitative. Perhaps we found no effect because we were dealing with children very different from those in other studies; perhaps because we used very different procedures.

In summary, there are quite a few studies indicating that imitating normal and retarded children on simple experimental tasks makes them more imitative of an adult on those same tasks. Whether or not it is helpful to imitate children during imitation training or at other times in the hope of making them more imitative has not been clearly established by research.

Humor

Humor, like imitation, has been suggested as a management technique for many years. For example, Redl and Wineman (1952) described "tension-decontamination through humor", i.e., kidding a child out of a temper tantrum, as a tactic for dealing with extremely aggressive children. They describe one incident involving a sullen preadolescent boy as follows:

> Finally he got to a case of cigarettes I keep for visitors and, taking one, said at the same time, "I'm gonna take this fuck'n cigarette," putting it in his mouth. I replied, "I guess you'll need this fuck'n lighter, then," passing him my lighter. He quickly grinned and said, "Here," tossing back both cigarette and lighter to me. With this, his "ornery" mood seemed to be dispelled (p. 175).

Although humor has occasionally been used as a technique in therapeutic work with adults (e.g., Smith, 1973), we have found no behavioral research indicating the value of humor with children. The only suggestions of its value that we can find are in anecdotal reports. Perhaps humor can sometimes be helpful in defusing a crisis situation.

We do agree with Redl and Wineman (1952) that sarcasm, cynicism, and ridicule are totally wrong and should always be avoided. There is a fine line between good-natured humor that might have a therapeutic effect and sarcasm or ridicule that has no place in child management or teaching.

Disproportionate Reward

We have occasionally heard the suggestion that a child's behavior may be changed dramatically by giving him a reward that is completely out of proportion to the difficulty or significance of a desirable behavior he has just performed. For instance, a child might be awarded 1,000 points (in a token economy where 100 points is an average day's earnings) and a lot of hoopla made about his performance when he comes to class on time. (Presumably, in this instance the child's tardiness has been a persistent problem.)

We know of no research on the value of disproportionate reward. It is an idea, as far as we can tell, that simply has not been checked out empirically.

Summary of the Unexpected

Of the techniques we've discussed in this section, humor and disproportionate reward would seem to have the most serious limitations. Humor depends to a great extent on arranging or capitalizing on unexpected situations, crises, or sequences of events; it often can not be programmed carefully in advance. By its very nature it is antithetical to proven behavior management principles, which stress regularity and predictability in the arrangement of environmental events. We are not suggesting that humor has no place in behavior management or that it is a useless technique in all situations. But it looks to us as if its value will be limited to a few situations, probably to an occasional situation in which the teacher or other adult intuitively recognizes that the child can be humored through or out of an unpleasant episode. It seems unlikely that behavioral research will ever add significantly to the anecdotal reports of the use of humor, since baseline and intervention phases of behavioral research require a standard set of circumstances and a consistent application of consequences.

Disproportionate reward can not be used often. Thus, it is limited to very occasional application and can not be systematically applied. More than very infrequent use of this technique would obviously decrease its value and would perhaps decrease the value of the reward in its usual quantities as well.

Imitating the child may be effective in some cases for reasons other than its novelty or unexpectedness, i.e., it can be applied consistently and frequently as a consequence for a particular response and may function similarly to other positive or negative social consequences. However, it may also occasionally have a dramatic but very temporary effect on behavior due to its novelty. When considering the use of unexpected consequences, it is important to consider that they may have some utility in producing a quick and marked reaction of some sort from the child but that they are not likely to be useful in maintaining a change over a period of time. Furthermore, unexpected consequences may produce unexpected effects. We suspect that in the great majority of situations a predictable response from an adult will have the best chance of producing a predictable and desirable behavior in the child.

SELF-CONTROL

In recent years there has been an increased emphasis on the importance of establishing appropriate behavior in children that is independent of control by the teacher or other external agent. There is a growing concern among educators and researchers with the manner in which children learn to establish performance goals, monitor and evaluate their performance, and reinforce themselves relative to their achievement. Thoresen and Mahoney (1974) have discussed the practical value of self-control, pointing to several advantages: If a person is taught to manage his own behavior, little professional time will be required to make behavior change. In addition, the person for whom a behavior change is desired may be in the best position to effect the change, since he is likely the only person having continuous access to the behavior. Self-control procedures may be carried out in the natural environment, thereby facilitating generalization and maintenance of improved behavior. Finally, the individual trained in self-control techniques can use his knowledge in subsequent attempts to control a variety of behaviors.

While self-control situations generally involve reciprocal interaction between self-control and external control systems, we will consider self-control to be a process in which a person acts as the agent of his own behavior change. Self-control studies with children have dealt with a variety of behaviors--among them disruptive classroom behavior (Bolstad & Johnson, 1972; Bornstein & Quevillon, 1976; Broden, Hall, & Mitts, 1971; Drabman, Spitalnik, & O'Leary, 1973; Kaufman & O'Leary, 1972), on-task behavior (Glynn, Thomas, & Shee, 1973; Sagotsky, Patterson & Lepper, 1978; Thomas, 1976), academic performance (Glynn, 1970; Knapczyk & Livingston, 1973), stealing (Stumphauser, 1976), cross-gender play (Rekers & Varni, 1977), and toileting behavior (Paschalis, Kimmel, & Kimmel, 1972; Plachetta, 1976; Stedman, 1972).

The majority of studies utilizing self-control techniques have been conducted with adults and normal children; however, research suggests that self-regulatory behaviors can be established for all behaviors ranging from personal hygiene to aggressiveness for retarded children (Mahoney & Mahoney, 1976). Kurtz and Neisworth (1976) identified three self-control strategies which appear to have implications for exceptional children: self-observation, self-reinforcement, and cue-regulation. Although these strategies are frequently used in conjunction with one another, they are discussed separately below.

Self-Observation

In instituting self-control procedures, self-observation is the first step towards self-change. Basically, it involves monitoring one's own behavior, which requires making a discrimination regarding the presence or absence of a behavior and subsequently recording the response (Thoresen & Mahoney, 1974). Self-observation alone can result in behavior change (Kazdin, 1974). Gottman and McFall (1972) instructed seventeen "potential high school dropouts" to record their frequency of oral class participation or non-participation. Subjects who monitored instances of participation increased the behavior while those who monitored nonparticipation (the number of times they desired to speak but refrained) decreased oral participation. In another study, Sagotsky, Patterson, and Lepper (1978) instructed elementary school children to record on-task behavior during a math lesson by marking a plus or minus on a sheet of paper whenever they thought about it. Another group of children was asked to set daily goals according to how far they thought they could progress during the lesson and to record whether or not they reached their goal. A third group was asked to use both the goal-setting and the self-monitoring procedure. Results indicated that the self-monitoring procedure alone increased on-task behavior and academic accuracy. Goal-setting did not affect either variable, nor did it enhance the self-monitoring procedure. The authors suggest that goal-setting may have been ineffective because the individual mathematics lessons varied greatly in difficulty, thereby preventing children from setting realistic goals.

It is likely that self-observation will result in greater behavior change when the individual desires to modify the behavior (Sagotsky et al., 1978). Broden, Hall, and Mitts, (1971) assessed the effects of self-observation in two studies with eight grade students. In the first study, an eight grade girl who had requested help with her performance in history class, recorded her own study behavior during class and subsequently increased the behavior. The result is interesting in view of the fact that her self-observations were fairly inaccurate. In the second study, an eighth grade boy monitored his frequency of talking out during math class. Talkouts decreased initially; however, self-recording had little effect during the final phase of the study. Two major differences in these studies may have accounted for the effectiveness of one procedure but not the other. First, the female subject requested help with her behavior, while the male subject was referred by his teacher for inappropriate behavior. Second, the female subject's increase in study behavior was differentially reinforced with teacher praise. The initial decrease in talkouts by the male subject resulted in no such reinforcement. The findings of this study suggest that self-control procedures may be enhanced by providing some external reinforcement for behavior change. Thomas (1976) instructed eight disruptive second graders to record a check whenever they were on task at the sound of a buzzer and rewarded them with their choice of games according to the number of checks recorded. Self-recording and reinforcement increased on task behavior and maintained the improved behavior for more than two months.

A variety of methods can be used for self-observation in the classroom. Thoresen and Mahoney (1974) suggest the use of small, unobtrusive devices such as wrist counters or knitting tallies which fit easily on a pencil. Children may count every behavior or, if the behavior is so frequent that continuous recording will prevent class participation, an "all-or-none" recording system may be used in which the child records the presence or absence of a behavior during a time interval. Portable timing devices may be useful for signaling the end of an interval. Another method of recording behavior which may be especially useful for handicapped children is the "countoon". The countoon divides the behavior to be monitored into three parts which specify with stick figure drawings what the person does before, during, and after the behavior. In the space provided for self-recording, the child circles the number which indicates how many times the behavior occurred (Thoresen & Mahoney, 1974).

The behavior to be changed may be monitored before, during, or after it occurs. However, recording the response before it occurs or at its onset may be more likely to result in suppression of the behavior than applying consequences after the behavior occurs (Kazdin, 1974).

Schedules of self-monitoring are, as yet, relatively unexplored, but, as Kazdin (1974) notes, the literature on reinforcement schedules would suggest that continuous self-recording of behaviors will be more effective than intermittent schedules in modifying behavior. Once the behavior has been changed, an intermittent self-recording schedule might be used to maintain the behavior.

Another consideration in implementing self-recording procedures is the efficacy of monitoring the target behavior as compared with monitoring an incompatible behavior. As mentioned previously (Gottman & McFall, 1972) the behavior monitored, whether compatible or incompatible with the target behavior, may increase. Kazdin (1974) suggests that simultaneously monitoring target and incompatible responses will be most effective in changing behavior because a response alternative is provided.

Fixsen, Phillips, and Wolf (1972) measured the reliability of delinquent boys' reporting of their own behavior and the behavior of their peers. Their findings suggest that the boys were not naturally reliable observers but that reliability could be improved by providing training on behavioral definitions and by making points contingent on agreement between self or peer report and the report of a peer or independent adult observer.

While self-monitoring may alter a behavior regardless of its accuracy (Broden, Hall, & Mitts, 1971), it becomes increasingly important to establish reliable self-reporting when self-evaluations are to be rewarded. Santogrossi, O'Leary, Romanczyk, and Kaufman (1973) assessed the effects of self-evaluations alone, external token reinforcement, and token reinforcement for self-evaluations with nine emotionally disturbed adolescent boys. Self-evaluation alone was ineffective. A teacher-administered point system dramatically reduced disruptive classroom behavior; however, a switch to self-determined points, which initially maintained improved behavior, resulted in a return to a high rate of disruptions. When disruptions increased, the subjects continued to evaluate themselves as behaving appropriately. A matching condition was then implemented in an attempt to promote accurate self-evaluations. The subjects were told that they would receive points for closely matching self-evaluations to teacher evaluations and would lose points for inaccurate self-evaluations. The matching phase was quickly terminated, as the subjects refused to cooperate and became more disruptive. The authors point out that self-evaluations were accurate until points were made contingent on high ratings which resulted in the students' inflating their evaluations. Suggestions were made for shaping the children to match teacher ratings by: (1) having the students and teacher rate simultaneously for a while with feedback provided by the teacher; (2) awarding bonus points for increasingly closer matching; and (3) decreasing penalties for less inaccurate matches. Drabman, Spitalnik, and O'Leary (1973) successfully employed a matching technique to improve both social and academic behavior in 9-to-10-year-old-boys with adjustment problems. Initially, tokens were delivered for nondisruptive behavior, after which bonus tokens were given for matching self-evaluations to teacher-evaluations. Teacher evaluations were then gradually faded out, leaving the children with total responsibility for evaluating their behavior. Accurate self-evaluations were maintained.

Self-Reinforcement

Bandura (1971) outlined several subsidiary processes of a self-reinforcing event. First, the individual sets a standard of behavior against which he evaluates his own performance. Second, the individual compares his behavior with the behavior of other persons. Third, the individual has control over the reinforcers, and fourth, he is his own reinforcing agent. Bandura and Perloff (1967), in a study with elementary school children, used a self-reinforcement procedure involving all four of the above processes with external reinforcement, noncontingent reinforcement, and no reinforcement.

Self-reinforcement and external reinforcement were equally efficacious, and both sustained significantly more behavior on a cranking response than the other two conditions. Another finding was that the children typically imposed highly unfavorable schedules of reinforcement upon themselves. Glynn (1970) also found that children in a self-reinforcement study self-imposed strict reinforcement ratios. His study with ninth grade girls compared the effects of self-determined, experimenter-determined, and chance determined token reinforcement on performance in hisotry and geography class. Self-determined and experimenter-determined reinforcement were equally effective and were superior to chance-determined reinforcement. Children who were initially in the chance-determined condition received inconsistent reinforcement, which prevented subsequent self-determined reinforcement procedures from having a positive effect. This finding suggests that the ability to apply self-determined reinforcement standards is influenced by previous externally-determined standards.

Bandura (1971) suggested that self-reinforcing responses may be established through differential reinforcement. He discussed the influence of external reinforcement on subsequent self-reinforcement. When subjects are consistently rewarded for meeting a criterion and are not rewarded or are punished for failing to meet the criterion, they will be likely to adopt the same self-reinforcement pattern. Bandura also states that people generally adopt the standards of self-reinforcement that are exhibited by exemplary models. The teacher who wishes to establish stringent self-reinforcement patterns in his/her children should consistently model these patterns and impose them when delivering reinforcement. Praising children for adhering to strict patterns of self-reinforcement will facilitate maintenance of high standards.

Several other studies have demonstrated the efficacy of self-reinforcement procedures with children. Glynn, Thomas, and Shee (1973) found that self-reinforcement procedures with second graders maintained a high level of on task behavior previously established with external reinforcement. Bolstad and Johnson (1972) found self-reinforcement procedures slightly more effective than external reinforcement in maintaining reduced disruptive behavior of first and second graders.

Although most of the self-reinforcement studies have been conducted with normal children, self-reward techniques can also be used with exceptional children. Non-verbal severely retarded children were taught to reward themselves by taking a snap bead for each successful completion of a task. Sufficiently long chains of beads were later traded for primary reinforcement (Kurtz & Neisworth, 1976). Further research on self-reinforcement with handicapped children is needed.

Cue Regulation

Cue regulation involves altering conditions antecedent to a target behavior (Kurtz & Neisworth, 1976) An illustration of this procedure is provided in a study in which students improved their study behavior through several self-control techniques including using a prearranged room for studying only, gradually increasing study time, and utilizing a consistent study procedure (Kurtz & Neisworth, 1976). Plachetta (1976) implemented a treatment package which included a cue regulation technique to eliminate encopresis in a first grade boy. The subject was encouraged to go to the bathroom four times per day and attempt to eliminate and carried a pictorial cue with him as a reminder. The treatment, which also involved positive reinforcement for appropriate toileting behavior, was successful; however, the design of the study did not allow for an analysis of the separate components of treatment. In the Broden, Hall, and Mitts (1971) study involving self-recording of an eighth grade girl's study behavior, cue regulation played an important role in the final phase of the study when the self-monitoring card became a discriminative stimulus for study behavior.

Another form of cue regulation suggested by Kurtz and Neisworth (1976) having practical value for use with exceptional children involves self-instructional training. In two studies, Meichenbaum and Goodman (1971) trained impulsive children to talk to themselves and assessed their subsequent performance on a variety of nonverbal tasks. The training procedure involved having the subject observe the experimenter perform a task while talking to himself. Next, the subject performed while the experimenter talked, followed by the subject performing while talking to himself. Finally, the subject faded talking to a whisper and then a covert response. Self-instructions consisted of questions about the nature and demands of the task, answers to the questions and formulation of a plan, self-guiding suggestions while performing the task, and self-reinforcement. Self-instructional training was effective in reducing impulsive behavior in the first study. In the second study, cognitive modeling alone sufficiently slowed down responding; however, self-instructional training was necessary for reducing errors. Bornstein and Quevillon (1976) successfully employed a similar self-instructional package to reduce disruptive behavior in three preschoolers in a Headstart program. Improved behavior generalized to the classroom setting and was maintained for more than 22 weeks.

Summary

Further research is needed before definitive statements regarding the efficacy of self-control strategies with exceptional children can be made. On the other hand, existing research indicates that self-control techniques may be useful in the modification, maintenance, and generalization of a variety of behaviors in handicapped children who have some degree of self-awareness and self-regulation.

Systematic reinforcement, modeling, feedback, roleplaying and gradual transfer of control from teacher to child will enhance the training of self-control techniques. Finally, self-control procedures will be most effective when used in conjunction with other treatment strategies.

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